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ABSTRACT

This collection of papers offers a comprehensive text about contemporary physical activities and sports forms. It provides students with an overview of the various physical activities, skill technique required, safety, scoring, rules and etiquette, strategies, equipment, and related terminology. The 26 papers are: (1) "Physical Fitness" (Carolyn Masterson); (2) "Aerobic Fitness" (Robyn Snyder Walters); (3) "Learning Motor Skills" (Judith Rink); (4) "Archery" (Kathleen M. Haywood); (5) "Badminton" (Donald C. Paup); (6) "Basketball" (James E. Bryant); (7) "Climbing and Challenge Course" (Anthony J. Doody); (8) "Cycling" (Gary L. Wilson); (9) "Dance Education" (Barbara Lorraine Michiels-Hernandez); (10) "Flag Football" (Maryann Domitrovitz); (11) "Floor Hockey" (Gary R. Gray); (12) "Golf" (Harvey R. White); (13) "Inline Skating" (Chet Bunting); (14) "Lacrosse" (Kim Hutcherson); (15) "Orienteering" (Jeanne O'Brien); (16) "Self-Defense" (Kenneth G. Tillman); (17) "Soccer" (William T. Weinberg); (18) "Softball" (Lynda B. Ransdell and Alison Taylor); (19) "Swimming" (Ralph L. Johnson); (20) "Team Handball" (Mary Phyl Dwight and Mike Cavanaugh); (21) "Tennis" (Joanne Margaret Hynes-Dusel); (22) "Track and Field" (Nancy Knop); (23) "Tumbling" (David A. Feigley); (24) "Ultimate" (Ken Demas); (25) "Volleyball" (Barbara L. Viera); and (26) "Weight Training" (Barney R. Groves). (Chapters contain references.) (SM)

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Physical Activity & Sport

for the Secondary School Student

ED 470 726

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Physical Activity & Sport for the Secondary School Student

Fifth Edition

Edited by

Neil J. Dougherty
Rutgers University
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A project of the
National Association for Sport and Physical Education
an association of the American Alliance for Health, Physical Education, Recreation and Dance

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Physical Activity & Sport for the Secondary School Student

Foreword

Physical education and sports, like other educational programs, have been undergoing continual revision. In response to developments in the field, the Middle and Secondary School Physical Education Council, a structure of the National Association for Sport and Physical Education, has updated and completely revised the popular book, Physical Education and Sport for the Secondary School Student.

The earlier editions and now the fifth edition reflect efforts of many concerned and knowledgeable professionals to provide secondary school teachers and students with a comprehensive and authoritative textbook about contemporary physical activities and sports forms. This fifth edition of Physical Activity and Sport for the Secondary School Student includes additional activities that address the evolving needs and interests of Secondary School students. The book is designed to provide the student with an overview of the various physical activities, skill and technique required, safety, scoring, rules and etiquette, strategies, equipment, and related terminology. In addition, chapters cover concepts of learning motor skills and fitness activities.

It is the intention of the National Association for Sport and Physical Education that this book will assist the student and physical education teacher by providing information to support a well-balanced program of activities which today's youth can practice throughout their lifetime.

This book should be used in conjunction with an awareness and understanding of the NASPE documents defining quality physical education including Moving into the Future and Appropriate Practices for Middle and High School Physical Education. These materials provide the framework to help teachers develop positive, contemporary physical education programs that will facilitate student learning of skills and knowledge needed to pursue healthful activities throughout life.

Judith C. Young, Ph.D.
Executive Director
National Association for Sport and Physical Education

Physical Activity & Sport for the Secondary School Student

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I would like to extend my sincere thanks to the individual authors who collaborated on this project. Chosen because of their professional knowledge and prominence, they committed an enormous amount of time and energy to produce a book in which they can all, justifiably, take great pride.

In addition, I wish to extend my appreciation to the following organizations and individuals who provided their professional expertise:

- USA Gymnastics and Connie Maloney, who graciously provided permission for NASPE to use illustrations by Wally Eyman from their publications in the Tumbling chapter.
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I am also very grateful to Adam Bixby, who kept this very complex project under control in this office. Thanks, Adam—you make my job much easier and more enjoyable.

I would be remiss if I failed to acknowledge the efforts of Pia McCarthy, Kathy Stark, and the rest of the NASPE Staff, as well as copyeditor Noel King and illustrators Jane Bagby and Norm Johnston. Always open-minded and supportive, they remained unyielding in their commitment to professional excellence. One cannot work with such people and fail to recognize why NASPE is such a successful and highly respected professional association.

Neil J. Dougherty, Editor
Rutgers University
New Brunswick, New Jersey

Physical Activity & Sport for the Secondary School Student

Table of Contents

Chapter 1: Physical Fitness—*Carolyn Masterson* 1
Chapter 2: Aerobic Fitness—*Robyn Snyder Walters* 21
Chapter 3: Learning Motor Skills—*Judith Rink* 35
Chapter 4: Archery—*Kathleen M. Haywood* 45
Chapter 5: Badminton—*Donald C. Paup* 59
Chapter 6: Basketball—*James E. Bryant* 83
Chapter 7: Climbing and Challenge Course—*Anthony J. Doody* 103
Chapter 8: Cycling—*Gary L. Wilson* 115
Chapter 9: Dance Education—*Barbara Lorraine Michiels-Hernandez* 121
Chapter 10: Flag Football—*Maryann Domitrovitz* 137
Chapter 11: Floor Hockey—*Gary R. Gray* 147
Chapter 12: Golf—*Harvey R. White* 163
Chapter 13: Inline Skating—*Chet Bunting* 181
Chapter 14: Lacrosse—*Kim Hutcherson* 197
Chapter 15: Orienteering—*Jeanne O'Brien* 211
Chapter 16: Self-Defense—*Kenneth G. Tillman* 223
Chapter 17: Soccer—*William T. Weinberg* 241
Chapter 18: Softball—*Lynda B. Ransdell and Alison Taylor* 273
Chapter 19: Swimming—*Ralph L. Johnson* 289
Chapter 20: Team Handball—*Mary Phyl Dwight and Mike Cavanaugh* 309
Chapter 21: Tennis—*Joanne Margaret Hynes-Dusel* 327
Chapter 22: Track and Field—*Nancy Knop* 351
Chapter 23: Tumbling—*David A. Feigley* 365
Chapter 24: Ultimate—*Ken Demas* 411
Chapter 25: Volleyball—*Barbara L. Viera* 419
Chapter 26: Weight Training—*Barney R. Groves* 439

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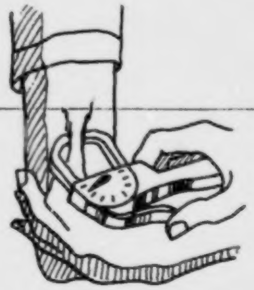
CHAPTER

Physical Fitness



Carolyn Masterson
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Introduction

On July 11, 1996, the Center for Disease Control (CDC) and the President's Council on Physical Fitness and Sports released a report titled *Physical Activity and Health: A Report of the Surgeon General.* The report's first recommendation states that regular physical activity directly relates to improved health benefits. The report's second recommendation states that physical activity is directly linked to physical fitness. Therefore, moderate amounts of physical activity performed most days of the week substantially reduces the risk of death from coronary heart disease, the leading cause of death in the United States and, participation in physical activity reduces hypo-kinetic diseases such as non-insulin dependent diabetes, hypertension, colon and ovarian cancer, and symptoms of anxiety and depression (USDHHS, 1996).

Also, researchers found that physically active people had lower yearly medical costs, fewer hospital stays and physician visits, and used less medication each year than inactive people. In fact, they had $330 less medical costs. Jeffrey Koplan, M.D., M.P.H, and Director of CDC, stated, "This study suggests that we can make a major impact on reducing health care costs by encouraging regular physical activity. The amount of physical activity required to make a difference is reasonable and well within the reach of most Americans" (Koplan, 1996).

The United States loves to think of itself as a nation focused on health and wellness. Yet, nearly half of American youth participate minimally in physical activity and 14% do not participate at all. Behind a nation that watches sports, joins a few fitness clubs and rarely bikes and hikes, lies a generation of youth who are, for a large part, inactive, unfit, and increasingly overweight. The percentage of overweight American youth has more than doubled since the 1970s. Of children aged 5 to 10 who are overweight, 61% have one or more cardiovascular disease risk factors. Now an increasing number of teenagers and preteens must be treated for diabetes and strive to ward off the lifetime health-related complications that it can cause (Wolf, 1998). Obesity-related diseases cost the United States economy more than $1 billion every year, and inactivity and poor diet cause at least 300,000 deaths a year (Koplan, 2000).

The Healthy Goals 2010 report on adolescents and physical activity states that fewer than 1 in 4 youth get 20 minutes of vigorous activity every day of the week. In fact, as chronological age and school grades increase, participation in physical activity declines. This decrease is more noticeable for girls than for boys, both in vigorous physical activity in general and in team sports (USDHSS, 2000). At the same time, daily enrollment in physical education has dropped from 42% to 29% between the years 1991and 1999. In spite of these statistics, students should learn about fitness education and physical activity in their health and physical education classes. The Surgeon General's Report states that there is a desperate need for teachers to teach about health and wellness concepts in their classes and to get the youth of all ages to participate in moderate to vigorous physical activity most days of the week (USDHHS, 1996). Only 19% percent of high school students report being physically active for at least 20 minutes or more during their physical education classes. Judith C. Young, Ph.D., Executive Director of the National Association for Sport and Physical Education (NASPE), said, "There is no place in this

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country for even one poor physical education program. We believe every student in our nation's schools, kindergarten through 12th grade, should have the opportunity to participate in a quality physical education program. Children need to be taught the knowledge, skills, and attitudes necessary for them to lead healthy, active, and productive lives" (NASPE Press Release, 2000).

On December 15, 2000, the United States Congress approved $5 million for the Physical Education for Progress (PEP) Act. Under the PEP Act, the Secretary of Education can award grants to help start, expand, and improve physical education programs for kindergarten through grade 12 students. Funds can be used to purchase equipment, develop curriculum, hire and/or train PE staff, and support other programs that will help students to participate in physical education activities. Although only $5 million was actually appropriated for fiscal year 2001, the bill authorizes $400 million for PEP programs over the next five years. Therefore, it is important for students and teachers to write their national and state legislators to make certain that the rest of the Physical Education for Progress Act funding is awarded to school districts who need money to develop their programs.

Physical Activity and the Components of Physical Fitness

Students spend a majority of their waking hours in schools. It is the obligation of health and physical education teachers to provide students with the knowledge, motor skills, confidence, and attitudes to participate in physical activity on a regular basis. Students must learn about all types of physical activity, learn to set goals for themselves, and make good decisions about leading a healthy lifestyle. Then it is up to the students to carry out these decisions into their adult life.

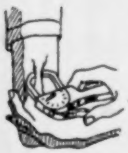
There are several reasons why students should learn about and participate in regular physical activity. Research shows that participating in regular physical activity during childhood and adolescence improves strength and endurance, helps build healthy bones and muscles, helps control weight, reduces anxiety and stress, and increases self-esteem. It also improves blood pressure and cholesterol levels (USDHHS, 1996). In addition, research suggests that well-planned physical activity creates rapid and often dramatic improvements in concentration, memory, reading, and writing, as well as listening and physical coordination (Dennison, 1998). Lastly, physical activity helps students to improve motor skills, to stay in shape and look better, and to interact and have fun with friends (USDHHS, 1996).

According to the U.S. Department of Health and Human Services (USDHHS 1999), young people must be taught the skills, knowledge, attitudes, and behaviors that lead to regular participation in physical activity. Health and physical education programs are probably the most important intervention for promoting desirable physical fitness levels and physical activity patterns (Harrell et al., 1998). At a young age, students should be encouraged to learn the value of regular physical exercise and physical activity. Furthermore, the public believes physical education is vital for preparing youth to be "happy, healthy, and productive" adults (Pate & Hahn, 1994, p. 4).

Many people fail to participate in enough physical activity and/or exercise to stay physically fit; others participate in physical activity but do not train properly and injure themselves. They do not have a clear understanding of what physical fitness is and how to become physically fit. To correct this problem, it is important to develop a clear definition of physical fitness. The term *physical fitness* is familiar to almost everyone. Some would say that physical fitness is a condition that enables a person to have enough energy to meet the demands of everyday living, to reduce the chances of disease, and to improve the quality of life. Others would say that physical fitness enables the body to meet the demands of physical activity and exercise. Being physically fit means that various systems of the body function efficiently so that a person can perform his/her work as well as pursue recreational and leisure activities without being unreasonably tired. Everyone needs a minimum amount of physical fitness to be healthy and well. It affects the total person: intellect, emotional stability, physical conditioning, and stress levels. The road to physical fitness includes proper medical care, nutrition, and appropriate daily physical activity.

Physical fitness is divided into two types—health-related and skill-related. Health-related fitness focuses on factors that promote health and wellness. Skill-related fitness focuses on factors that improve your ability to play sports and/or participate in some form of physical activity.

Health-related fitness components prevent the onset of disease and problems associated with inactivity. The components of health-related fitness include cardiorespiratory (aerobic) fitness, muscular strength and endurance, flexibility, and body composition. The following are definitions for the components

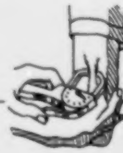


of health-related fitness:

- **Cardiorespiratory Endurance** is the ability of the heart and lungs to sustain moderate to intense whole body activity for extended periods without undue stress to the body. This includes requiring a strong heart, healthy lungs, and clear blood vessels to supply the body with oxygen so that the body's energy system has the power to carry out and use nutrients as fuel. Cardiorespiratory endurance is often measured by a concept called maximum oxygen uptake (VO_2 max). This means how well one consumes oxygen during moderate to vigorous physical activity. Very often, the terms *cardiovascular fitness* and *cardiorespiratory fitness* are used interchangeably.
- **Muscular Strength** is the ability of a muscle to generate enough force during a single maximal contraction in order to exert an external force or to lift a heavy weight. *Dynamic strength* is the force exerted by a muscle group as the body moves in space, such as a push-up or curl-up. *Static strength* is the force exerted by a muscle group against an immovable object such as a wall lean. Developing muscular strength requires working against a resistance in a progressive manner.
- **Muscular Endurance** is the ability of a muscle to generate enough force so that a person can repeat the movements for a long period without undue fatigue. Muscular strength and endurance improves when an exercise repetition is worked at 60-80% of 1RM. One RM is the maximum amount of resistance a person can move or lift during one repetition. *Repetitions* are one complete performance, and *sets* are repetitions grouped together. Muscular endurance improves as repetitions and sets are added to the muscular strength exercise.
- **Flexibility** is the ability to move joints freely through their full range of motion. Flexibility is affected by length of muscles, joint structure, fat around bone joints, and body temperature. Flexibility is improved through stretching. There are several training techniques used in stretching that are discussed later in the chapter.
- **Body Composition** is a ration of height to weight that is often used as an indication of obesity in our general population. The weight of our bodies includes body fat, muscle, bones, and other organs in the body. Although genetics, environment, and culture play significant roles in body composition, a person's nutritional habits and physical activity levels also have a big effect on body composition. Adolescent obesity is defined as having 32% or more body fat. Body Mass Index is explained later in the chapter and gives the formula to figure out percent of body fat.

The six skill-related fitness components are probably most important to sport performance. There are other abilities that also contribute to playing sports, such as visual perception (the ability to judge distances correctly) and visual tracking (the ability to follow moving objects). In addition, individuals can possess an aptitude in one skill-related fitness component and not in another. However, good athletes are more likely to be above average in most of the components. Health-related fitness is not a substitute for skill-related fitness when it comes to playing sports. However, performance is often enhanced by health-related fitness. Therefore, players on teams who need agility, speed, and reaction time also need cardiorespiratory endurance to play for a long time without getting tired. The six skill-related fitness components are agility, balance, coordination, reaction time, speed, and power.

- **Agility** is the ability of the body to rapidly and accurately change direction of the body's movement in space as quickly as possible. Wrestling and basketball are examples of games that take exceptional agility.
- **Balance** is the ability to maintain the body's equilibrium while stationary or moving. Performance on a balance beam and ice-skating are examples of activities that take balance.
- **Coordination** is the ability to use the senses in conjunction with body parts at the same time to perform motor tasks smoothly and accurately. Types of coordination are eye/hand or eye/foot. Playing tennis, striking a golf ball, and punting a football are examples of activities that take a lot of coordination.
- **Reaction time** is the amount of time that elapses between the stimulus and the reaction to that stimulus. An example of reaction time is the take-off at the start of a race after the gun sounds.
- **Speed** is the ability of the body to perform a movement or cover a distance in a short time period. Sprinting in a track meet or running a punt back on a football team are examples of speed.



- **Power** is the ability of a muscle to transfer energy in order to exert force (muscular strength) at a fast rate. Examples of force are swinging a bat and throwing the discus on a track team.

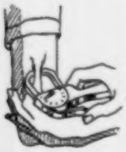
Principles of Training and Physical Fitness

In order to create a workout, you must learn several basic principles of training. These principles help make workouts more safe and challenging. The purpose of a warm-up and a cooldown in an exercise workout is to prepare the body not only physically but also to ensure safety for the stress of a workout. The warm-up should include a form of activity that prepares the heart muscle and skeletal muscles. Sample warm-up activities could be a few minutes of brisk walking or jogging or playing a game to increase the heart rate. Both upper body and lower body stretches should be included. A cooldown allows the body to return to a more normal state and gives the body a chance to recuperate and be in a safe state. Stopping abruptly keeps blood in the muscles that were being used and puts undue stress on the heart. Walking and stretching once again at the end of the workout should be incorporated into the workout plan. Environmental conditions also should be taken into consideration before planning to work out. Hot, cold, or windy weather, as well as high altitude, limit performance. Overheating the body or dropping body temperature is dangerous to the systems of the body. Therefore, workouts during these conditions need adjustment.

Exercise or physical activity should be chosen carefully in order for a basic level of health-related fitness to be achieved. Exercise and physical activity should be increased gradually and in a systematic way in order for the body to adapt to its workload. Incorporating the principles of training in a workout improves the chances that the workout will provide an optimal threshold of activity and that the target zone in each of the fitness components will be reached in order to improve fitness. Two important concepts about training are *overload* and *progression*. The *overload principle* states that the body must encounter a workload above what it is accustomed to for improvement in physical fitness to occur. The workload must *progressively* become more difficult at a safe rate in order for physical fitness to occur.

Several variables determine the threshold of training and target zone for each of the health-related fitness components. In order for exercise to be effective, it must be done with enough frequency, intensity, and time. Also, the exercises must be performed specific to the health-related fitness component.

- ***Frequency*** refers to how often or how many days a week a person performs the exercise and/or activity. The CDC report states that working out or participating in aerobic endurance activities should be at least 20 to 30 minutes most days of the week. Most experts believe that muscular strength and endurance exercises should be limited to every other day unless particular muscle groups are exercised on alternate days. Flexibility should be done before and after each workout and/or activity session.
- ***Intensity*** means how vigorously a person should exercise during a physical activity period. Griffin defines intensity as the "power output of an exercise" that "is dependent upon the resistance and speed of movement" (AAHPERD, 1999c, p.101). Intensity is measured differently for each of the fitness components. Cardiorespiratory endurance is measured by sustaining an activity in a target heart rate zone for a period. Muscular strength and endurance is measured by the amount of weight lifted or the amount of resistance felt in an exercise. Flexibility is measured by how the stretch feels, the level of tension, and muscular discomfort. Carefully monitoring intensity is important in order to prevent injury.
- ***Time*** refers to how long you should exercise. Cardiorespiratory endurance is measured by the amount of time that exercise and/or physical activity is accumulated throughout a day. It is recommended that adolescents participate in at least 20 minutes of moderate to vigorous activity 3 to 5 days a week. The number of repetitions and sets done during strength exercises is the measure for muscular strength and endurance. The number of times per stretch during flexibility exercises is the measure for flexibility.
- ***Type*** or ***specificity*** refers to the type of training specific to the system a person works during exercise or physical activity. Cardiorespiratory endurance is achieved through activities that increase the heart rate such as walking, jogging, running, dancing, or playing in active games. There are several types of exercises used to



improve muscular strength. Body weight or resistance training, free weights, and several types of weight training equipment are used to improve muscular strength and endurance. The type of weight training must be appropriate to the age, ability, and wellness of the individual. There are two main types of stretching exercises—static and dynamic or ballistic stretching. They will be discussed later in the chapter. You should choose static or dynamic stretching according to your age and level of flexibility.

All too often, workout programs are not carried out successfully on a daily basis. The best way to insure success in a workout plan is to choose exercises and activities that are enjoyable and motivational to practice. Also, gradual and proper training increases the success of improved fitness levels and prevents injury. When workout plans are not carried out on a regular basis, fitness levels in the body decrease. This is called the ***Principle of Reversibility***. This is why it is important to work out most days of the week. It is important to understand that using the principles of training in workouts makes the workouts more healthy and sound to perform. It also makes the workouts more enjoyable to perform and improves the health-related fitness of the doer.

Healthy Heart and Physical Fitness

Cardiorespiratory fitness requires a fit heart muscle. The heart is the most important organ of the body because it keeps cells alive by pumping blood throughout the body. A healthy heart handles the demands placed on it. It is important to understand how the heart works in relation to exercise and fitness levels.

The heart beats about 40 million times a year, pumping 4,000 gallons of blood around the body and carrying oxygen to the muscles of the body. Muscles need an energy source and oxygen to contract during exercise. Oxygen is breathed into the lungs and carried around the body by the red blood cells. There are two systems that control the way oxygen is used to burn ATP, a high-energy source broken down from the food nutrients' carbohydrates, protein, and fats in the body's muscles: the **aerobic system** and the **anaerobic system**. The **aerobic system** is in effect during low to moderate intensity workouts when the cardiorespirtory system is able to deliver enough oxygen to the muscles. Therefore, the oxygen used by muscles to burn off fuel is in balance with oxygen breathed in by the lungs. Exercise and/or activities that are aerobic are the most effective means of improving cardiorespiratory fitness. Keeping your target heart rate for more than 20 minutes through activities such as walking and jogging are examples of aerobic exercise.

The **anaerobic system** of the body is in use at higher intensities of activity. The cardiorespiratory system does not have enough time to "catch up" to the intensity of the activity or the lungs are not able to deliver adequate oxygen to the muscles. Therefore, the muscles use more oxygen than what is taken in by the lungs. When the muscles run low on oxygen, they use their own source of energy to maintain their ability to contract and/or work. This causes the muscles to produce lactic acid. Sometimes too much production of lactic acid makes your muscles sore and tired (Powers & Dodd, 1999, pp. 74-75). Examples of anaerobic exercise are wind sprints and/or agility drills. The terms *cardiorespiratory fitness* and *aerobic fitness* are often used interchangeably. Physicians have asserted that moderate amounts of daily physical activity improve cardiorespiratory fitness. Sessions of moderate to intense activity, such as brisk walking for 30 minutes, or in shorter sessions of more intense activity, such as jogging or playing basketball for 15–20 minutes, improve cardiorespiratory endurance (USDHHS, 1996).

The gold standard for determining your cardiorespiratory fitness is called **maximum oxygen uptake (VO_2 max)**, the maximal (max) ability to supply oxygen to the body during maximal exercise over time. It is only determined under a laboratory setting where a person is monitored by an electrocardiogram. There are easier ways to perceive and/or determine how fit you are becoming. Taking your pulse and/or wearing a heart rate monitor during physical activity and/or exercise lets you know whether you are working in the target heart rate zone. This will be discussed later in the chapter. The last method is called the Borg's **Rate of Perceived Exertion (RPE)**. With this method, numbers on a scale represent perceived levels of cardiorespiratory endurance during various types of activities. The scale ranges from a 6 or 7, which is a very, very light workout, to an 18 or 19, which is a very, very difficult workout (Corbin, Lindsey, Welk, & Corbin, 2001, p. 117). During cardiorespiratory exercise, you can estimate an exertion rate and compare that estimate to the chart.

Monitoring your heart rate helps you receive immediate feedback about the intensity of your cardiorespiratory endurance. Being able to know and keep the target heart rate zone during exercise or physical

activity is not only safe but also motivational. There are two methods of measuring the workload of the heart—manually by feeling your pulse or electronically by using a heart rate monitor. To measure using your pulse (**palpitation method**), you can count the number of heart beats at the arteries on the wrist or carotid artery in the neck for one minute using a forefinger or middle finger. The other method is to use electric meters. There are two types of electric meters used to measure heart rate. The first is a **pulsemeter** that measures the blood flow rate in the finger and/or earlobe, calculates it, and displays the heart rate on a monitor The second is a **heart rate monitor** that measures the electrical activity of the heart through an electrode on the chest. It counts the number of signals that tell the heart to beat, and transmits the heart rate to a receiver that displays the heartbeat (Kirpatrick & Birnbaum, 1997, pp. 5-6).

In working to improve cardiorespiratory endurance, it is important to understand different types of heart rates. The **maximum heart rate (MHR)** is calculated at 220 beats per minute, according to several reputable studies on children's maximum heart rates (Kirpatrick & Birnbaum, 1997, p. 8). It is the maximum rate the heart pumps blood per one minute. The **resting heart rate (RHR)** is the lowest rate the heart pumps blood per minute; it is taken when the body is at rest, such as before getting out of bed in the morning. The resting heart rate is used to measure the **threshold heart rate (THR)**. To calculate the threshold heart rate (THR), subtract the resting heart rate (RHR) and the age from 220 (maximum heart rate). This number becomes the **heart rate reserve (HRR)** and is used to calculate the **target heart rate zone (THRZ**). To find the target heart rate zone, take a lower and higher percentage of the heart rate reserve and add the resting heart rate back on to each of these answers. For example, a 14-year-old seeking a basic level of aerobic fitness would find his/her target heart rate zone the following way:

220 – (75 (RHR) + 14(age) = 131 (HRR)
.40 x 131 (HRR) = 53 + 75 (RHR) = 128 THRZ
.85 x 131=(HRR)= 111 + 75 (RHR) = 186 THRZ

This example denotes a Target Heart Rate Zone Range from 128 beats per minute to 186 beats per minute.

Keeping within a target heart rate zone improves cardiorespiratory fitness and is safe for the heart. The lower number represents a heart rate zone for aerobic activity; the higher number represents a heart rate zone for anaerobic activity. A person with a lower level of aerobic fitness should work at a lower range until fitness improves. A person with a higher level of aerobic fitness is capable of working at a higher range.

Nutrition and Physical Fitness

It is important to understand the relationship between being physically fit and proper nutrition. Nutrition and physical fitness go hand in hand. The percentage of children and adolescents who are overweight has more than doubled in the past 30 years, and most of the increase has occurred since the late 1970s. Of young people in the United States aged 6 to 17 years, about 5.3 million or 12.5% are overweight. Obese children and adolescents are more likely to become obese adults (Koplan, 2000).

Being physically fit and maintaining a good diet go hand in hand. A good diet includes eating a balanced variety of food nutrients: carbohydrates, fat, protein, vitamins, minerals, fiber, and water. In order to maintain a healthy diet and keep a healthy body weight, the intake of food should meet the demands for fuel consumption or expended energy. Although we all have the same nutritional needs, each of our bodies uses food differently based on age, gender, heredity, and lifestyle. There should be a balance between the calories taken in daily through food and the calories used up through daily living, exercise, and physical activity. If more calories are taken in than are expended, fat will be stored in the body. In other words, a calorie is a calorie, and you must match consumed use of food with expended use of calories.

The safest and most effective way to lose weight is to increase how many calories you use through exercise. Increased exercise combined with taking in fewer calories speeds up how fast the calories are used. Moreover, severe "crash" diets should be avoided. They are nutritionally unsound and often lead to serious medical complications. Too often teens, especially girls who have low self-esteem, use dieting as a means of controlling decisions they make about their lives. They end up acquiring serious nutritional diseases such as bulimia and/or anorexia. An excellent resource for nutritional information is the Nutrition Action Health Letter from the Center for Science in the Public Interest. The address is Suite 300, 1875 Connecticut Avenue, N.W., Washington, DC 20009-5728.

Goal Setting and Fitness Plans

Goal setting helps you think about personal fitness

levels. To start, you should test your personal health-related fitness to get your baseline fitness scores. There are a list of FITNESSGRAM assessments that can help you get these scores, such as the Pacer test, the walk test, push-ups, curl-ups, the back-saver sit and reach, and the Body Mass Index formula. There is an explanation of these assessments later in the chapter. It is a good idea to assess fitness levels early in the school year so that baseline scores can be established. These baseline scores can then be used to develop a fitness plan for the rest of the school year.

Too often fitness plans are developed that are either too easy or too difficult to attain. Understanding fitness levels provides a starting place for developing a fitness plan for each of the health-related fitness components. The minimum level is called a **baseline fitness level.** This level of fitness means you are healthy but cannot participate optimally in organized sports or activity. If you are at this level, your plan should include minimal levels of activity and exercise with the desire to improve fitness at a slow and safe pace.

The intermediate range is an **optimum fitness level.** This level enables participation in recreational activities and sports with enjoyment. Therefore, the plan should include fitness opportunities that challenge the level. The **athletic performance level** is the highest range of fitness. This level of fitness enables you to perform in highly active interscholastic sport competition. The plan for this level should include challenges that test athletes to exert themselves (AAHPERD, 1999, p. 81).

In order to modify fitness behavior patterns, you must follow educationally sound strategies. Time should be set aside to measure fitness levels in order to create baseline scores. The goals should be realistic, challenging, and measurable. Teachers should provide feedback and support in order for the goals to be achieved.

The following are a few guidelines to help establish goals to improve fitness levels:

- Set realistic goals after self-evaluation and consultation with a fitness expert and/or a health and physical education teacher.
- Establish short-term goals that are motivational and attainable.
- Establish long-term goals based on physical limitations and heredity.
- Write goals down and put them in a place where they can be seen as a daily reminder.
- Recognize that being physically fit is a serious priority and that healthful fitness habits enable fitness goals to be reached.
- Participate in all types of physical activity in and out of school to achieve the goals.

Physical Fitness and Fitness Plans

In order to meet established goals to improve fitness, you must create a personal fitness plan. There are stages to think about when developing a fitness plan so that it is more successful and safe to follow. During the **Initial Stage**, fitness is assessed, the fitness plan is constructed, and the training procedures (exercises and/or physical activity) are initiated. During this stage, it is important to not overdo in order to avoid soreness, injury, and personal discouragement. Most often, fitness goals that were set are reached during the **Refinement Stage.** During this stage, it is important to reevaluate and even refine the exercises using the Principles of Training (FITT). During the final stage, called the **Maintenance Stage**, it is important to stay focused and to participate in new physical activity that is valued and successful. Sometimes fitness workouts become boring and are forgotten at this stage. This is when reversibility of fitness occurs. Understanding the stages help you to create fitness plans that are realistic and will last a lifetime.

There are several training techniques to improve health-related fitness. Most often, these techniques are influenced by the FITT Principles (frequency, intensity, time, and type). The techniques are used to develop interesting and enjoyable fitness plans and to improve all of the health-related fitness components.

Long, slow distance training improves cardiorespiratory endurance and is done gradually over long distances such as in jogging, biking, and rollerblading. **Cross training** changes the type of exercise that is used during the workout. Jogging and/or biking one day and swimming the next are examples of changing types of aerobic activity. Another form of cross training is to change the fitness components. Training for cardio one day and training for muscular endurance the next is an example. Cross training reduces boredom and allows the body to recuperate from the type of activity used in the workout. The final type of training is called **interval training.** This type of training repeats periods of intense exercise followed by periods of rest. The length of the rest period depends on the intensity of the exercise interval. Examples of interval training are performing plyometrics for 20-30 seconds, resting for 5-10 seconds, and then beginning again.

Progressive resistance training (reps and sets) improves muscular strength and endurance. One RM is the maximum amount of resistance a person can move or lift during one repetition. Muscular strength and endurance improves when an exercise repetition is worked at 60-80% of 1RM. Repetitions are one complete movement or lift, and sets are repetitions grouped together. Progressive resistance training is performed using isotonic, isometric, and isokinetic exercise.

- ***Isotonic exercise*** involves concentric and eccentric contraction of muscle groups during movement. Examples of isotonic exercises are push-ups and curl-ups.
  - **Free weights** are a form of constant resistance exercise.
  - **Plyometrics** is an example of an eccentric loading exercise. Jumping on and off benches repeatedly is an example of a plyometric exercise. Figure 1 illustrates selected plyometrics that are useful in training for sports such as softball and basketball.
  - **Speed loading** involves moving or lifting a heavy weight as rapidly as possible. Performing a "bench press" is an example of speed loading.
- ***Isometric exercise*** involves a contraction of the muscle without a change in the length of the muscle. In other words, the muscle contracts but does not flex or extend. The wall lean and arm press off the wall are examples of isometric exercises.
- ***Isokinetic exercise*** is similar to isotonic exercises. The muscle flexes and extends, but the movement involves exerting force at a constant speed against an equal force throughout the exercise, using special strength training machines such as the Mini-gym, Apollo, and/or Cybex II. These training machines are very expensive and are usually found in conditioning rooms in some high schools and/or health clubs.

The third group of training principles affects exercises that improve flexibility.

- ***Static stretching*** involves slow, gradual, and controlled elongation of the muscle and joints through a full range of motion. The muscle is slowly held in a stretch position for several seconds. Examples of static stretching are the back-saver sit and reach, the trunk twist, the calf stretch against the wall, and the standing thigh stretch. Static stretches can be active or passive.
  - ***Active stretching*** occurs when the static stretch causes the opposite muscle group to contract. Examples of active stretching are lunges and the runner stretch (lunge position, front foot's toe points up, rock back, back foot's heel pushes down).
  - ***Passive stretching*** occurs when an outside force such as gravity or a partner is used to stretch a muscle. An example of passive stretching is the bent knee toe touch.
  - ***PNF*** (proprioceptive neuromuscular facilitation) ***exercise*** is a type of static stretch that is characterized by pre-contraction of a muscle to be stretched, relaxation of the muscle, contraction of the antagonistic muscle, then contraction once again of the original muscle. PFN stretching often uses resistance equipment such as Spri Bands, Dyna Bands, and resistance bands to stretch.
- ***Ballistic stretching*** occurs when a force causes the muscle to stretch by a bouncing, swinging, or jerking motion. Ballistic stretching can result in injury and, in general, produces no greater gains in terms of flexibility than the safer static techniques. For this reason, ballistic stretching is generally not recommended.

Figures 2-10 provide examples of flexibility exercises that are especially important for participants in activities such as inline skating and soccer. Increased flexibility can result in decreased injuries to participants.

Creating a training program involves selecting a variety of activities to improve health-related fitness. Alternating or changing them throughout the fitness plan makes it fun and enjoyable. Working out at fitness centers, attending dance and aerobic classes, and performing recreational activities such as skating and in-line skating, hiking, rowing and canoeing, biking, and skiing are some good examples. Walking or jogging to school, jumping rope at recess, participating during physical education in a target heart rate zone, working out in the school's fitness center, and participating in after-school sports are excellent ways to be physically active throughout school hours. Following a daily regimen of exercise and/or physical activity brings ownership and pride to improvement. These experiences have the power to change health behaviors for a lifetime.

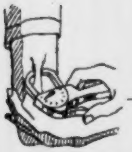


Figure 1. Plyometrics: (a) double leg bound, (b) alternate leg bound, (c) running bound, (d) lateral bound

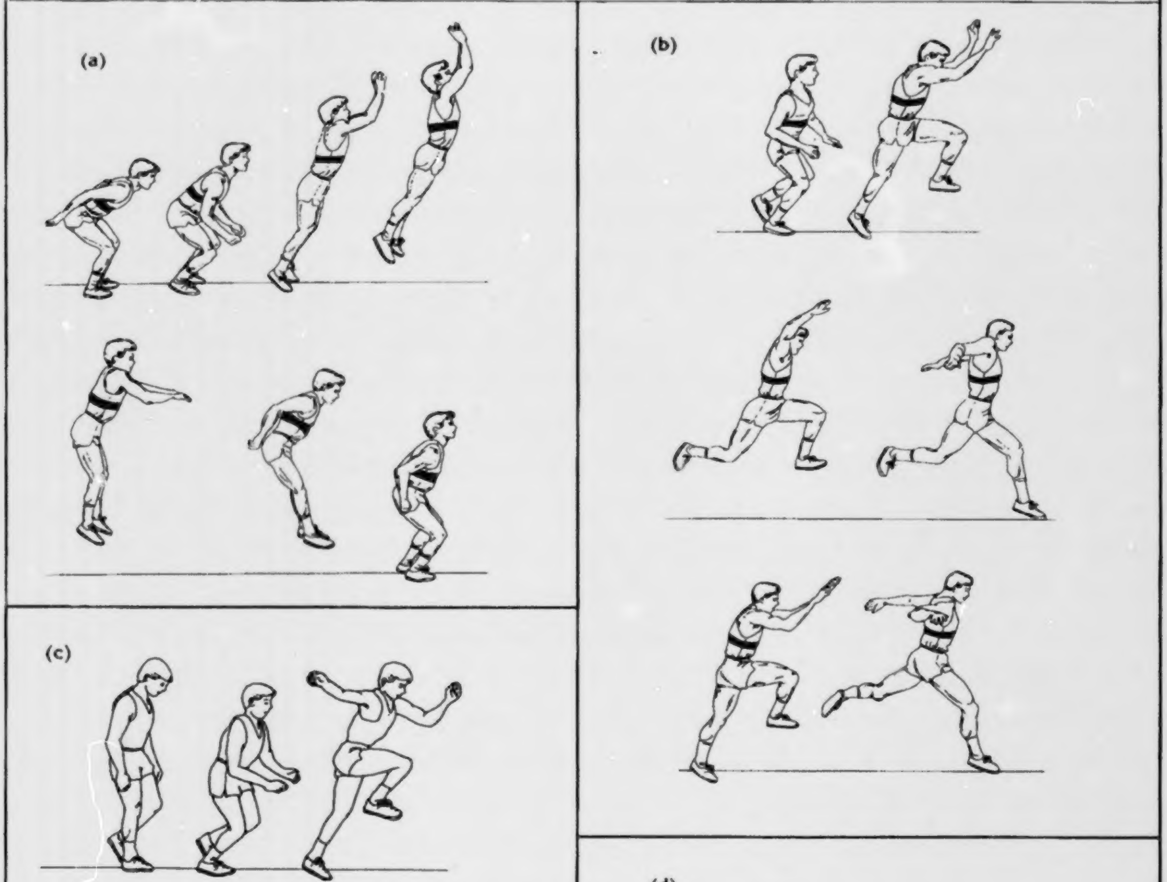


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Figure 2. Hamstring Stretch

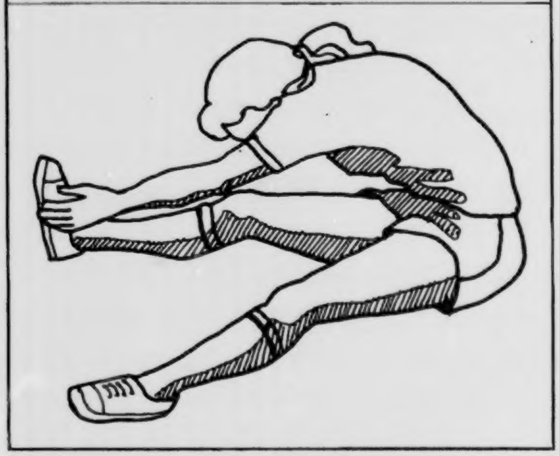


Figure 3. Hurdler Stretch

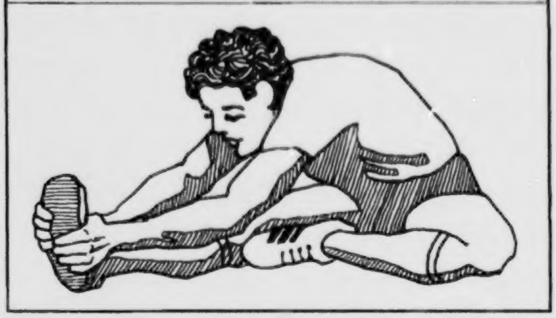


Figure 4. Groin Stretch

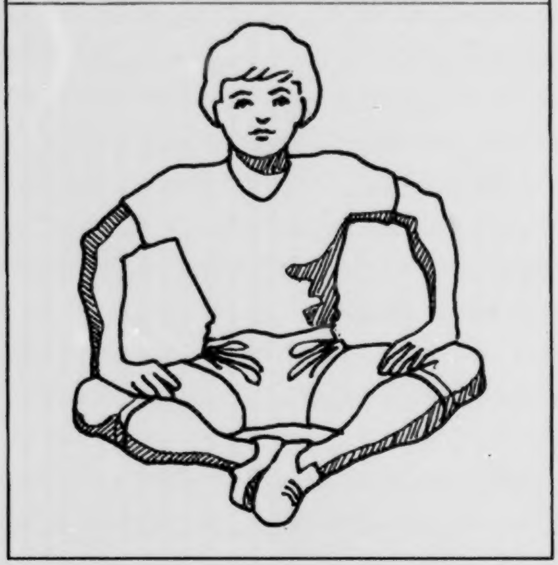


Figure 5. Quadriceps (Thigh) Stretch: Lunge Stretch

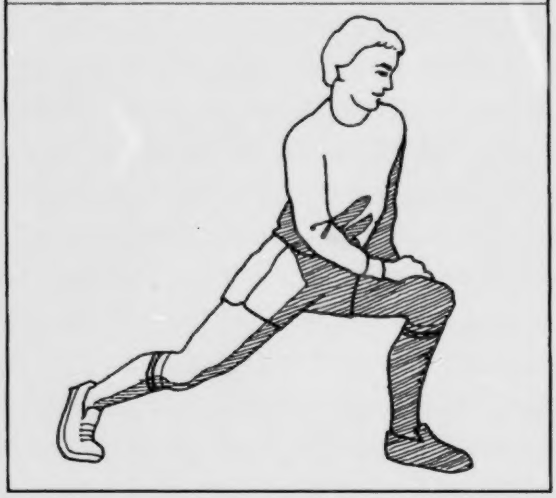


Figure 6. Hip Stretch

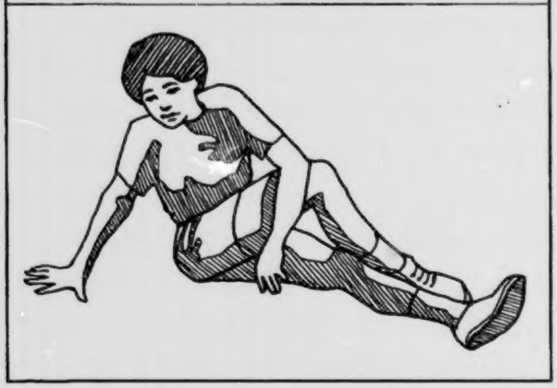


Figure 7. Gastrocnemius (Calf) Stretch: Wall Lean

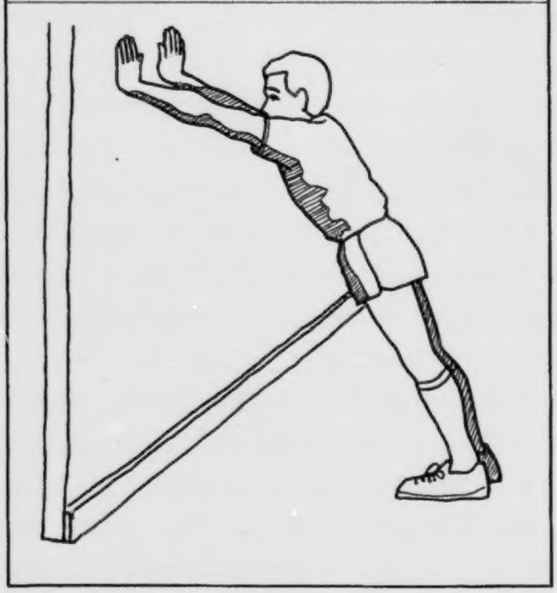


Figure 8. Abdominals and Back Stretch

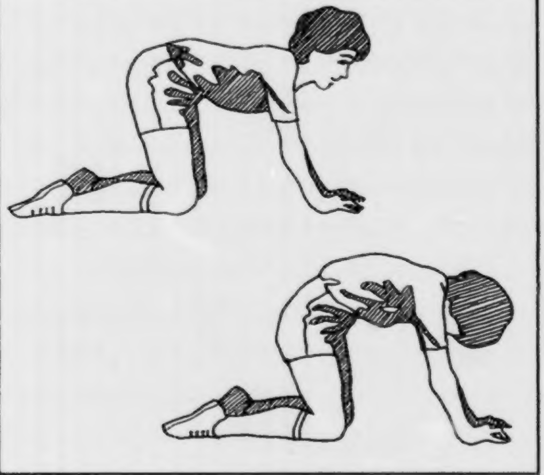


Figure 9. Steamboats

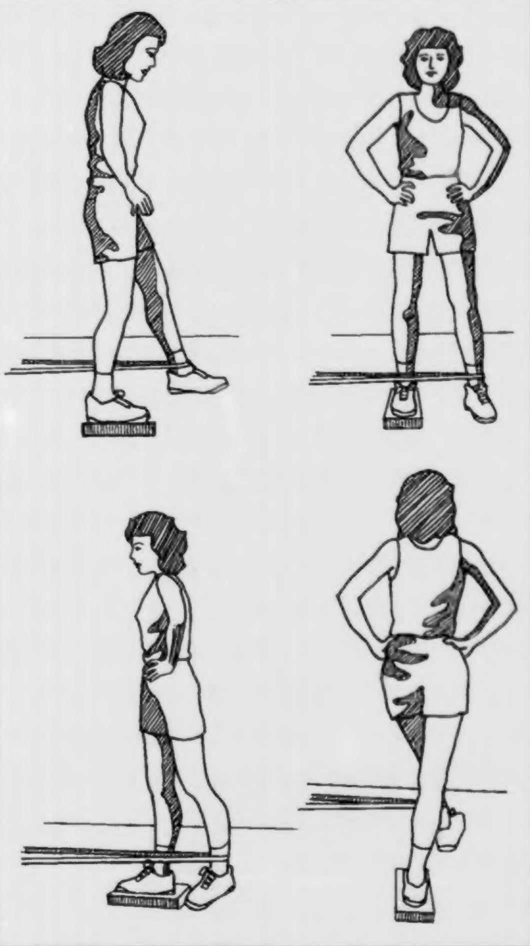
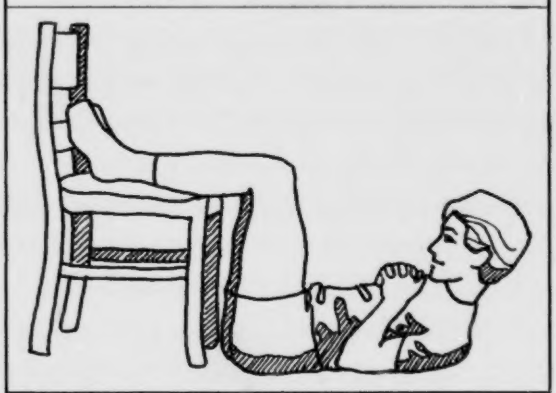


Figure 10. Abdominal Crunches

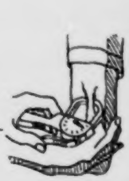


The Physical Best Program and FITNESSGRAM

Many fitness programs only evaluate fitness levels and do not educate students about the importance of being health-related fit and participating in physical activity. The Physical Best Program is a comprehensive fitness education program designed by experienced health and physical education teachers for teachers. The program challenges, encourages, and educates youth about the knowledge, skills, and attitudes needed for living a physically active, healthy lifestyle. The program provides educational activities to teach students kindergarten through 12th grade about health-related fitness.

In addition, the Cooper Institutes for Aerobic Research (CIAR) developed a comprehensive health–related fitness assessment called FITNESSGRAM as well as a physical activity evaluation called Activitygram. Both FITNESSGRAM and Activitygram were developed into a computerized reporting system so that students and teachers can record scores. Together, the Physical Best Program and FITNESSGRAM/Activitygram are a comprehensive curriculum package designed to support a school's existing health and physical education curriculum and to supplement daily health and physical education lessons.

Fitness education scholars and teacher practitioners at AAHPERD (American Alliance for Health, Physical Education, Recreation, and Dance), the CIAR, and Human Kinetics, a book-publishing firm, have worked together to develop resources. The resources were created to be inclusive of all types of students in a school and to assist teachers in meeting national and state standards in health, physical education, and dance. Furthermore, the program connects what has been



learned about health-related fitness in health and physical education classes to what students do outside of school.

There are several reasons why Physical Best and FITNESSGRAM is a comprehensive health-related fitness education program. The program enables students to learn about lifelong health and wellness. Students study the reasons why certain activities are health-related and others are skill-related. They learn that being physically fit and participating in physical activity benefits them the rest of their lives. Students in K-12 participate in all types of developmentally appropriate physical activities that teach physical fitness concepts and are fun to perform. The activities motivate students to learn about physical fitness concepts, partake in proper nutrition, and participate in physical activity in and out of school.

The Physical Best and FITNESSGRAM program is individualized. The program enables students of all abilities to learn about and improve their health fitness personal bests. The activities are developmentally appropriate and teach health-related concepts. Furthermore, students learn the Fitnessgram assessments to help them evaluate their own fitness levels. Students learn to set goals, create personal fitness plans, and attempt to attain their "Personal Best."

The Physical Best and FITNESSGRAM program is fair. When students evaluate their fitness levels, they are not compared to other students in the class, nor are they compared to students throughout the United States. Students perform their personal bests, self-assess their fitness levels, and try to improve.

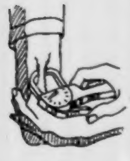
The Physical Best and FITNESSGRAM program is enjoyable and realistic. The program supports personal choice whenever possible. Students choose activities in which they want to participate in order to improve. Furthermore, they investigate many different ways to be physically active and participate in physical activity in real-life settings outside class. What's more, the FITNESSGRAM's software enables students to track physical activity levels over several days, using the student's side of the software, called ***Activitygram***.

Physical Fitness and Fitness Assessments

Several strategies should be followed in order for fitness testing to be a successful and a good learning experience. Tests should be valid and measure what they say they are going to measure, and the scores of the tests should be consistent in order to be reliable. There are several important strategies to follow in order for fitness testing to be a successful, valid, and reliable. Fitness testing should be planned in enough time that there is complete understanding of the testing protocol. Continued practice improves the testing protocols and is important for the validity and reliability of the test. More importantly, continued practice allows for self-evaluation and goal setting that improves fitness levels. In addition, there should be early communication with parents and administrators about the testing practices. Finally, a positive and noncompetitive testing environment should be arranged so that learning can take place.

There are several types of fitness tests used in schools. FITNESSGRAM is a health-related fitness assessment and computerized reporting system. The purpose of the FITNESSGRAM is to motivate and measure fitness progress. FITNESSGRAM's assessments enable students to create tests, evaluate their own fitness levels, and check whether they have met the goals they have set (Meredith & Welk, 1999). The computerized assessments also enable teachers to create individual and group reports about student fitness. In addition, the FITNESSGRAM software enables teachers and students to store results of the assessments and enables students to store the amount of physical activity they performed because of their fitness plan.

There are several reasons why the Physical Best and FITNESSGRAM Program is a more appropriate choice for students in schools. The Physical Best and FITTNESSGRAM Program has a strong fitness educational program. It brings together instruction about health-related fitness along with fitness testing. The President's Challenge, the Marine Corp Test, and the Amateur Athletic Union Physical Fitness Program assess both health-related and skill-related fitness components. All of these tests include an agility run; being agile does not make one healthier. Furthermore, these tests only offer an endurance run to evaluate cardiorespiratory endurance. Many students who take part in endurance runs consume oxygen too quickly, causing their muscles to fatigue. The three tests also recommend the pull-up test. This test is not valid because the failure rate is higher than the success rate. The three tests also base their scores on standardized norms comparing students to students. The tests give out badges to award students who pass and exclude students who do not do well. Goal setting and fitness planning are not part of their program. Often programs



like this cause students to compete against each other rather than work at improving their fitness levels.

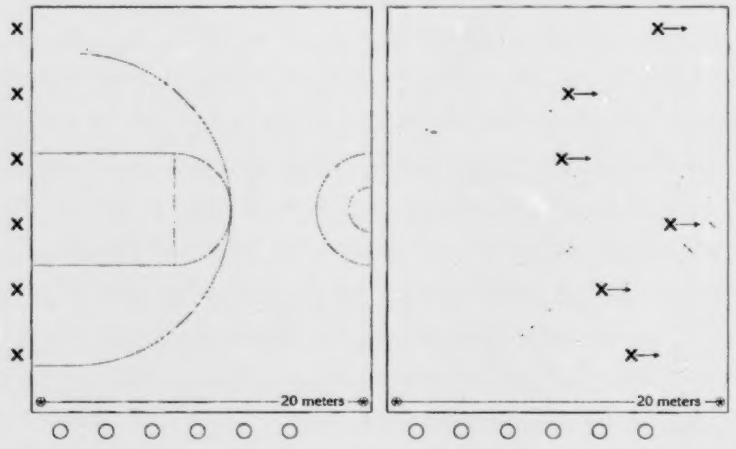
FITNESSGRAM's assessments measure four health-related fitness components: aerobic endurance, muscular strength/endurance, flexibility, and body composition. One or more fitness assessment measures each component. However, FITNESSGRAM recommends one assessment over the others in each component (e.g., the PACER test is recommended over the 1-mile run). In addition, FITNESSGRAM uses criterion-referenced standards to evaluate fitness performance. This means that specific criteria must be followed in the testing protocol and the standards are based on this criterion. Students' scores are compared to standards of health-related fitness that indicate levels of fitness necessary for optimal health regardless of others' scores. The criterion-referenced standards for each test fall in fitness zone ranges from Needs Improvement to Healthy Fitness. It is recommended to focus more on self-assessment and to not go beyond each age's highest standard. For further explanations of the Assessments and Standards, see the information at the end of this chapter regarding the Physical Best and FITNESSGRAM resources and those of Human Kinetics (American Fitness Alliance) for the materials, explanations, and standards for the test (Meredith & Welk, 1999).

The following are explanations for the FITNESSGRAM's assessments for each health-related fitness component:

Cardiorespiratory Endurance

- **The PACER** (Progressive Aerobic Cardiovascular Endurance Run)
  The recommended test. Set to music, the test is a 20-meter shuttle run that is performed easily at the beginning and gets progressively more difficult as the amount of laps increases and the time per laps is shortened. The numbers of laps are counted. There is a CD offered that explains and plays the assessments when your teachers order the *FITNESSGRAM Test Administration Manual* (Meredith & Welk, 1999). See Figure 11.

Figure 11. Pacer Test



⊛Make sure there is enough room to pivot at each endline.

- **One-Mile Run**
  The object is to run a mile at the fastest possible pace. If you cannot run, you may walk. A time is given for how fast the walk/run is completed.
- **Rockport Walk Test** (see Diagrams 1 and 2)
  Measure your body weight (in pounds) before taking the test. Then walk one mile as quickly as possible on a track or course that provides a measurement of a mile. The heart rate must stay above 120 beats per minute (bpm). A 10-second heart rate is taken at the conclusion of the test to acquire a one-minute heart rate. An estimated VO_2 max or maximal oxygen consumption is calculated using the Rockport Fitness Walking Test equation (Fahey, Insel, & Roth, 2001).

Muscle Strength and Endurance and Flexibility Tests

- **Curl-Up**
  This test is recommended. The object of the test is to complete as many curl-ups as possible with finger pads on the ground sliding across a plastic strip at a pace of 1 curl-up every 3 seconds. Count the number of curl-ups with the maximum being 75 (see Figure 12).
- **Trunk Lift**
  This test is recommended. Lying stomach down, hands tucked under the quadriceps, lift upper body off the floor slowly and in a controlled manner, using the muscles of the back. Hold

Diagram 1. Maximal Oxygen Consumption Formula

The following is the Maximal Oxygen Consumption Formula or VO_2 max Formula:

$$132.853 - (0.1692 \times \mathbf{W}) - (0.3877 \times \mathbf{A}) + (6.315 \times \mathbf{G}) - (3.2649 \times \mathbf{T}) - (0.1565 \times \mathbf{HR})$$

W=Weight in kilograms **A**=Age in years **G**=Gender (male=1; female=0)
T=Time to complete the 1-mile walk in a decimal figure.
HR=Exercise heart rate (beats per minute) or (bpm)

Diagram 2. Measuring Maximal Oxygen Consumption

Use the following work sheet to determine how to measure your maximal oxygen consumption formula:

Before the test, measure your body weight in pounds and convert to kilograms by dividing your weight by 2.2. Then multiply your weight in kilograms by 0.1692. This is your Weight Value.

Example: 120 lbs.

$\frac{120}{22}$ = 54.54   54.54 x 0.1692 = W9.23

$\frac{\text{lb lb lb}}{22}$ = kg kg.kg kg   kg kg.kg kg x 0.1692 = W W.W W

Walk 1 mile as fast as you can on a track/course, keeping the heart rate above 120 (bpm). At the end of the mile walk, write down your time and take your pulse for 10 seconds.

- Convert the Walk Test Time from minutes and seconds to a decimal figure by dividing the seconds by 60.

  Example: 14 mins 45 secs

  14 + $\frac{45}{60}$ = 14.75   m m + $\frac{\text{s s}}{60}$ = T T.T T

- To calculate your Heart Rate multiply your 10 second pulse rate by 6.

  Example: 22 pulse rate

  22 x 6 = 132 bpm   pr pr x 6 = HR HR HR bpm

Age Value in the formula is 0.3877 times your age.

Example: 16 years old

16 x 03877 = A6.20   a a x 03877 = A A.A A

To calculate your Gender Value, select your gender from the the following and multiply it by 6.315:
Male = 1 Female = 0

Example: Female

0 x 6315 = 0.000   g x 6315 = GV.GV GV GV

Using the respective values, complete the following calculations:

1. Subtract your Weight Value from 132.835:

Example:

132835 - W9.23 = 123.60

132835 - W W.W W = #1 #1 #1.#1 #1

2. Subtract your Age Value from the answer from calculation #1:

Example:

123.60 - A6.20 = 117.40

#1 #1 #1.#1 #1 - A A.A A = #2 #2 #2.#2 #2

3. Add your Gender Value to the answer from calculation #2:

Example:

117.40 + 0.000 = 117.40

#2 #2 #2.#2 #2 + GV.GV GV GV = #3 #3 #3.#3 #3

4. Multiply your Walk Test Time by 3.2649. Now subtract this number from the answer from calculation #3:

Example:

14.75 x 32649 = 48.16

T T.T T x 32649 = T2 T2.T2 T2

117.40 - 48.16 = 69.24

#3 #3 #3.#3 #3 - T2 T2.T2 T2 = #4 #4.#4 #4

5. Multiply your Heart Rate by 0.1565. Now substract this number from the answer from calculation #4. This will yield your maximal oxygen consumption:

Example:

132 x 0.1565 = 20.66

HR HR HR x 0.1565 = H2 H2.H2 H2

69.24 - 20.66 = 48.58 is your Rockport Walk Test Maximal oxygen consumption.

#4 #4.#4 #4 - H2 H2.H2 H2 = #5 #5.#5 #5 is your Rockport Walk Test Maximal oxygen consumption.

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the position no less than 6 inches and no more than 12 inches off the ground (see Figure 13).

- **Push-Up**
  This test is recommended. With elbows at an angle of 90 degrees, perform a push-up at a rhythmic pace of 1 every 3 seconds. Count the number of push-ups performed (see Figure 14).
- **Modified Pull-Up**
  The object of this test is to complete as many modified pull-ups as possible, using correct form and a modified pull-up stand. Count the number of modified pull-ups performed (see Figure 15).
- **Pull-Up**
  The object of this test is to complete as many pull-ups as possible, using correct form and a horizontal bar. Count the number of pull-ups performed (see Figure 16).
- **Flex-Arm Hang**
  The object of this test is to hold your chin above a horizontal bar for as long as possible. Count the number of seconds hanging in that position (see Figure 17).

Figure 12. Curl-Up

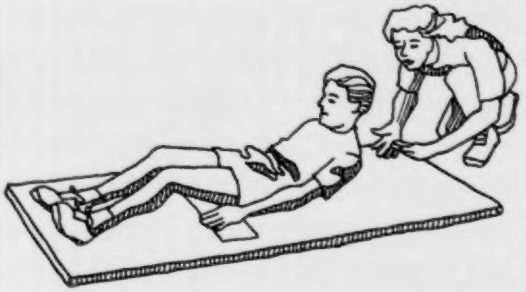


Figure 13. Trunk Lift

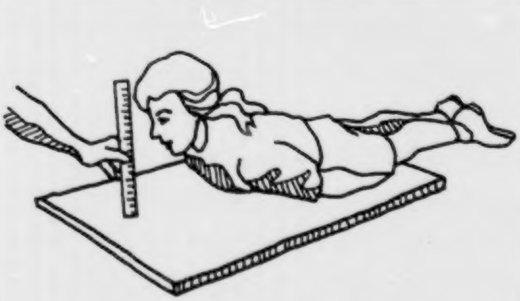


Figure 14. Push-Up

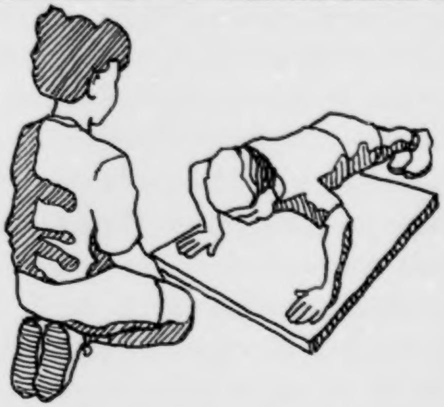


Figure 15. Modified Pull-Up

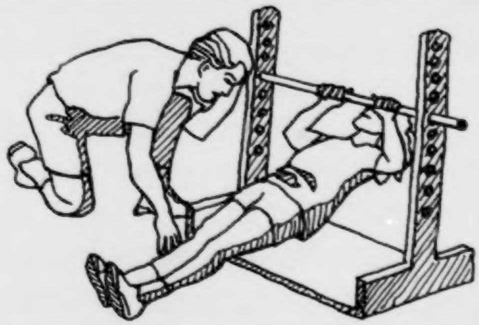
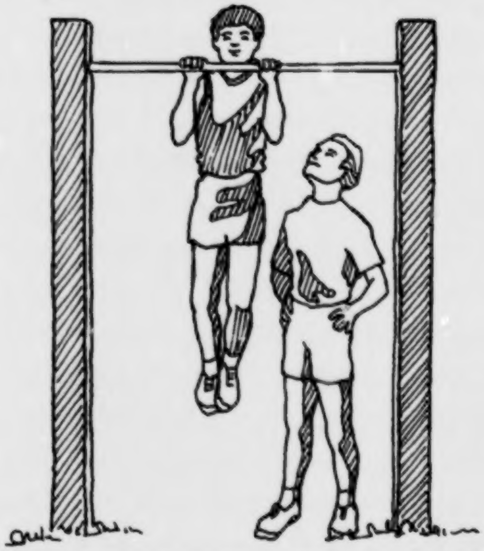


Figure 16. Pull-Up



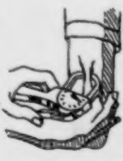
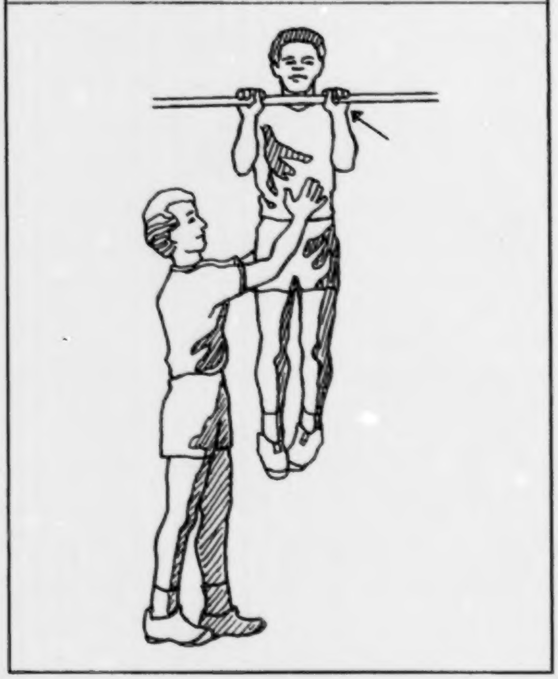


Figure 17. Flex-Arm Hang



Flexibility Tests

- **Back-Saver Sit and Reach**
  This assessment is optional. The object of the test is to stretch a specified distance using a sit and reach box. Shoes are off. Sitting on the floor, one leg is fully extended with the sole of the foot against the box. The other leg's knee is bent with the sole of that foot on the floor. Both hands are clasped together with arms straight over the head. Stretch and reach for a distance on the box. After the third stretch and reach over the box, hands stop at the furthest stretched distance. That score is recorded (see Figure 18).
- **Shoulder Stretch**
  This assessment is optional. The object of the test is to touch fingertips together behind the back by reaching over the shoulder and under the elbow. This assessment is done on both sides of the body. Touching fingertips together behind the back denotes a pass (see Figure 19).

Body Composition

- **Body Mass Index**
  Body mass index provides an approximate indication of the amount of body fat a student has compared to his or her weight and height. The BMI formula is Weight (kg) / Height (m^2). The computer software automatically indicates your BMI when you input your height and weight.

The formula for Body Mass Index:

Weight ________ lbs. Weight ________ Kg. (weight in lbs / (divided) by 2.2)

Height ________ in. Height ________ meters (height inches times .0254)

BMI weight (kg) ________(divided by) ________ height (meters) = BMI ________________.

Figure 18. Back-Saver Sit and Reach

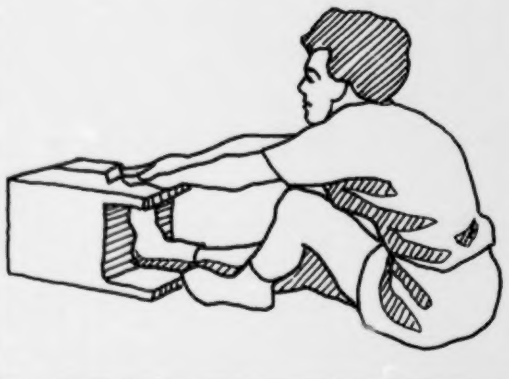
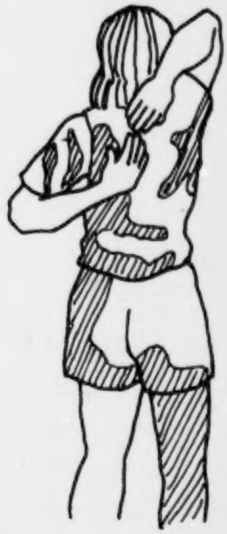
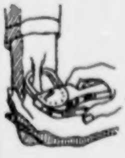


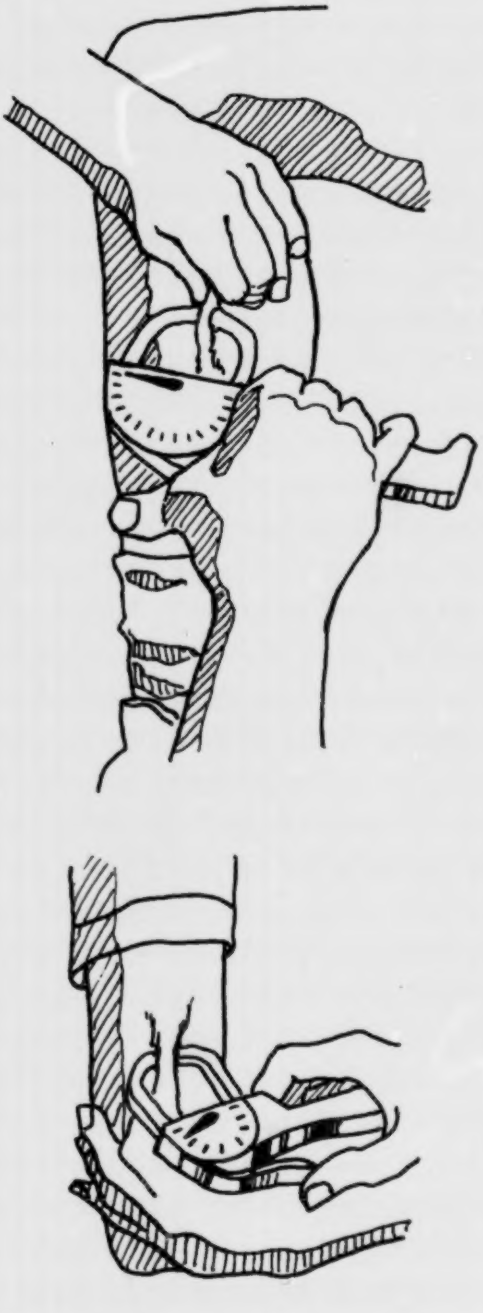
Figure 19. Shoulder Stretch





- **Skinfold Measurement**
  This test measures the triceps and calf skinfold thickness using a skinfold caliper (see Figure 20).

Figure 20. Skinfold Measurement



FITNESSGRAM Resources and Computer Software

Physical fitness scholars as well as teacher practitioners at AAHPERD, the Cooper Institute for Aerobic Research, and Human Kinetics Inc., have worked together to develop several resources that health and physical education teachers can use in their physical education programs. The following is a short explanation of these resources.

The *Physical Education for Lifelong Fitness, The Physical Best Teacher's Guide*, is a comprehensive guide for your teachers to learn about and successfully incorporate health-related fitness and lifetime physical activity into a physical education program. The book provides a conceptual framework about fitness education based on recent research and a wealth of examples from experienced physical education teachers. Part One of the book provides an overview of health-related fitness and how it can be integrated into your physical education program. Part Two of the book is a review of physical fitness concepts. Part Three of the book outlines strategies for developing a health-related fitness education curriculum. Part Four is an overview of the purpose of assessment. The book includes ready-to-use sheets and black-line masters for your use.

There are two activity guides that complement the Teacher Guide: *Physical Best Activity Guide, Elementary Level* and *Physical Best Activity Guide, Secondary Level.* These activity guides provide lessons to be used by your teachers in your health and physical education classes. The activities are designed to help you "do and understand" fitness concepts. Each lesson contains the purpose of the lesson, equipment needed, set induction, procedure for the activity, teaching hints, closure, assessments, and an extension of lesson ideas. The activities are developmentally appropriate and were created by experienced health and physical education teachers to instruct health-related fitness concepts.

The FITNESSGRAM Kit contains a Test Administration Manual, a CD that is used with the PACER, push-up, and curl-up tests, and a CD that contains the software for the FITNESSGRAM and Activitygram records and reports. The Test Administration Manual discusses the purpose of fitness assessment, explains the procedures for fitness testing and contains the FITNESSGRAM's Standards for Healthy Fitness Zone. The version 6.0 software allows teachers and students to report fitness scores. The software comes in PC and in MAC format. The "new" physical activity assessment, ***Activitygram***,

was added to reinforce the importance of developing lifetime habits of regular physical activity. It records for three days the physical activity carried out to improve fitness levels.

Other Fitness Education Resources

There are other resources that teachers should consider when developing a comprehensive health-related fitness education program. *FitSmart* is a national health-related physical fitness knowledge test. It is the first test to accurately measure knowledge of basic physical fitness concepts at the high school level. The ***FitSmart*** package contains software that enables students to take the test on a computer. It also enables health and physical education teachers to enter answers and grade the test on the computer. The ***Brockport Fitness Physical Fitness Test Kit*** enables teachers to accommodate students with special needs in physical education class. It is specifically designed to assess the fitness of youths from ages 10 through 17 who have physical disabilities. The manual and related resources provide teachers with everything teachers need to know to administer the test. The software is easy to install and use.

For more information regarding any of these resources, teachers should call **Human Kinetics** at **1-800-747-4457** and ask for the **American Fitness Alliance** or go on-line using **http:/www.americanfitness.net** and/or **humank@hkusa.com**. The American Fitness Alliance is a cooperative effort of the American Alliance for Health, Physical Education, Recreation and Dance, the Cooper Institute for Aerobic Research, and Human Kinetics. You can find a great deal of information to support learning about fitness education on the American Fitness Alliance Web site. On AAHPERD's Web site at **www.aahperd.org**, you can find a list of Physical Best and FITNESSGRAM Workshops offered throughout the United States at National, District, and State AAHPERD Conventions. Workshops bring professional development and training about Physical Best and FITNESSGRAM to teachers who want to learn more about health-related fitness and to improve their health and physical education programs. They can attend conferences, conventions and/or in-services in school districts.

Conclusion

It is important to know that ***The Healthy Goals 2010***, the national health objectives for the next decade, have identified physical activity as one of our nation's most important indicators for being healthy. This report states that physical activity is a critical national priority, especially among young people. Accordingly, on November 29, 2000, President Clinton asked the Secretary of Health and Human Services and the Secretary of Education to outline several strategies calling for better promotion of health for young people through lifelong participation in enjoyable and safe physical activity and sports. The report's directives call for the education of parents and/or guardians about physical activity. They also call for the promotion of daily, quality physical education with certified physical education specialists.

The report's directives will enable state departments of education to work with schools to provide the best health and physical education programs possible. Eventually the directives will provide money to help schools and communities provide safe and enjoyable after-school programs, as well as community and recreational programs for all young people. There will be an ongoing media campaign to promote physical education and long-term health. These changes will provide help so that everyone can take part in the joys of physical activity and incorporate physical activity and sports into their present and future life.

The full report is available on-line at http://www.cdc.gov/nccdphp/dash/presphysactrpt/ or HealthYouth@cdc.gov. In addition, there are several more on-line sites where you can research health and wellness as well as physical activity and sports:

PE Central on-line address – http://www.pecentral.org

PE 4 Life's on-line address – http://www.pe4life.com/

PE Links4U – http://www.pelinks4u.org/

The President's Council on Physical Fitness and Sport – http://www.fitness.gov

American Heart Association – http://www.amhrt.org/

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CHAPTER 2

Aerobic Fitness

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Introduction

Although human bodies are designed for vigorous movements on a daily basis, average lifestyles do not demand healthful levels of physical activity. Indeed, *most* adolescents and young adults between the ages of 14 and 18 years are *not* performing 20 minutes of vigorous physical activity at least three times per week (NIH Consensus Statement, 1995). However, it is well accepted that physical fitness is the best defense against many disease states or dysfunctions. Both the Centers for Disease Control (CDC) and the American College of Sports Medicine (ACSM) endorse the recommendation of a minimum of 30 minutes of moderate-intensity physical activity on most, if not all, days of the week (Pate et al., 1995). Physical fitness can be defined as *the ability to perform daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies.* There are multiple components of physical fitness, but most exercise scientists and health specialists agree that aerobic (or cardiorespiratory) fitness is the most important component due to its broad impact on health. This chapter provides a discussion of the importance of aerobic fitness and summarizes the recommended protocols for an effective aerobic fitness program. Additionally, this chapter will briefly present several of the most widely used forms of aerobic exercise.

Characteristics of Aerobic Fitness

In physical activity, the term "aerobic" is used to indicate that oxygen is either required to be present or utilized in the biochemical processes of energy production for working muscles. This complex and relatively slow type of energy production occurs within muscle cells and can provide energy for most activity intensities. Because muscle cells cannot store significant amounts of oxygen, the cardiorespiratory system (i.e., heart, lungs, blood, and blood vessels) must constantly transport oxygen from atmospheric air to the musculature. Thus, one's ability to perform aerobic exercise is dependent not only on the ability to deliver oxygen (and nutrients) to working muscles but also on the capacity of these muscles to utilize oxygen efficiently in the production of energy.

Aerobic fitness, also known as cardiorespiratory endurance, is the ability to perform dynamic, large-muscle group exercise in a prolonged fashion at moderate to high intensities (ACSM, 2000). Nonetheless, any exercise intensity that involves sustained elevation of the body's rate of oxygen consumption (VO_2) is considered aerobic in nature and can improve health status. Light to vigorous intensities fall within the aerobic category, whereas greater exercise intensities (e.g., very vigorous, exhaustive, maximal) are not considered aerobic in that they cannot be sustained for prolonged periods and require *anaerobic* metabolic energy production (a process in which oxygen is not used).

An individual who aerobically exercises undergoes many physiological adaptations. In the cardiorespiratory system, improvements in heart function (e.g., increased blood pumped per cardiac contraction), vascular delivery (e.g., decrease in peripheral resistance to blood flow), and blood composition (e.g., increased oxygen-carrying blood cells) are

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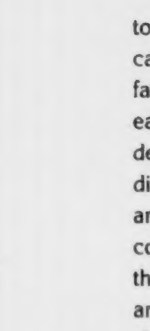
evident. This type of training will also encourage enhancements in neuromuscular transmission (i.e., stimulation of contractile activity in muscle cells) and muscular metabolic efficiency (e.g., increased ability to use aerobic metabolism). The rate of oxygen consumption during maximal aerobic (VO_{2max}) exercise reflects the upper limits of many of these physiological markers for an individual. VO_{2max} is known to vary depending on both the type of exercise performed and the fitness level of the individual. The extent of potential improvement in VO_{2max} depends on the initial value of VO_{2max} prior to training (e.g., lower initial values are associated with the larger increases) and an individual's genetic limits. Men typically have greater absolute VO_{2max} values than women, and this difference is related to body size.

Peak oxygen uptake (VO_{2peak}) may better reflect the functional capacity of adolescents because they are unlikely to reach true maximal efforts (as determined by a plateau in VO_2) even with exhaustive exercise. Also, maximal capacity is directly related to the biological maturation and gender of the individual. After age 12, boys continually increase their VO_{2max} up to the age of 18, whereas girls typically peak at 14 years of age (Robergs and Roberts, 2000). *Absolute* maximal oxygen uptake is lower in adolescents, but when expressed *relative* to body weight, male adolescents have similar VO_{2peak} values to young adult men. Relative VO_{2peak} values for female adolescents appear to be higher than for young adult women unless adjusted for height, and then the adolescent values are lower (Robergs and Roberts, 2000). Because it is difficult to predict specific physiological responses of the adolescent (due to nonuniform growth patterns), interpretation of these responses should be based on individual maturation.

Those with good aerobic fitness are well prepared to meet the physical demands of everyday life. They can enjoy vigorous leisure-time activities without undue fatigue and can perform occupational tasks with greater ease. Importantly, aerobic fitness decreases the risk of developing chronic diseases such as coronary heart disease, high blood pressure, obesity, diabetes mellitus, and some cancers. In addition, aerobic physical activity contributes positively to body weight and composition, the maintenance of healthy muscles, joints, and bones, and the sense of psychological well-being. The relationship between health and fitness was discussed in more detail in Chapter 1.



Principles of Improving Aerobic Fitness

Screening of Beginning Exercisers

Aerobic exercise, if used in a reasonable and progressive fashion, is safe for almost everyone. However, there is a small percentage of the population for whom vigorous exercise may increase the risk of cardiovascular or metabolic incidents. Accordingly, it is recommended that beginning exercisers be screened for the presence of conditions that could place them at risk during vigorous exercise.

The American College of Sports Medicine recommends that each person intending to begin an exercise program be given health and lifestyle evaluations. Table 1 presents the Physical Activity Readiness Questionnaire (PAR-Q), a screening tool commonly used to assess basic risk factors and contraindications to exercise. The results of this instrument are often used to determine which individuals should be evaluated by a physician prior to beginning an exercise program. General health history and lifestyle evaluations are ideally included as well. For a more detailed discussion of this screening process, the reader is referred to the ACSM's *Guidelines for Exercise Testing and Prescription (2000).*

It should be noted that the typical secondary school-age individual is at very low risk of experiencing a significant health problem during exercise. Therefore, it is not generally viewed as necessary for teenagers to complete extensive screening protocols prior to participating in physical education classes. Nonetheless, some individuals do have health problems that could limit their exercise tolerance or, in rare instances, preclude their participation in vigorous exercise. Table 2 lists a number of medical conditions sometimes seen in young people that would require physician clearance for participation in *vigorous* activity programs.

Aerobic Fitness Assessment

Prior to initiating an exercise program, participants should have their cardiorespiratory function assessed during both rest and exercise. Though maximal testing of those determined through screening to be apparently healthy is unnecessary, some form of a graded exercise test should be given to estimate functional aerobic capacity (VO_{2max}) and to affirm that exercise can be performed safely at high intensity. The baseline data established in such an exercise test can also be used

Table 1. Sample Physical Activity Readiness Questionnaire (PAR-Q). Adapted from PAR-Q Validation Report, British Columbia Department of Health, June 1975.

For most people, physical activity should not pose any problem or hazard. The PAR-Q (Physical Activity Readiness Questionnaire) has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them. In the interest of your safety in participation in aerobic activity, please supply the following information concerning yourself. This information will be held in the strictest confidence. Thank you.

NAME ______________________ AGE ________ SEX ________

1. Has your physician ever said you have heart trouble? ☐ yes ☐ no
2. Do you frequently suffer from chest pains? ☐ yes ☐ no
3. Do you often feel faint or have dizzy spells? ☐ yes ☐ no
4. Has a physician ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise? ☐ yes ☐ no
5. Is there a good physical reason not mentioned here why you should not follow an activity program? ☐ yes ☐ no

   If so, please list ______________________
6. Are you taking ANY prescribed or over-the-counter medication(s)? ☐ yes ☐ no

   If so, please list ______________________
7. Please take this opportunity to comment on any other information (medical, physical, orthopaedic, etc.) concerning your overall health and medical history relative to physical activity.

Table 2. Medical conditions, seen in some adolescents, that require physician clearance before participation in vigorous exercise or exercise testing.

Cardiac Abnormalities

Hypertrophic Cardiomyopathy
Marfan Syndrome
Coronary Artery Anomalies
Aortic Stenosis
Acute Rheumatic Fever with Myocarditis or Pericarditis

Musculoskeletal Disorders

Skeletal Deformities
History of Traumatic or Overuse Injuries
Muscular Dystrophy

Convulsive Disorders

Epilepsy

Thermoregulatory Abnormalities

History of Heat Illnesses

Metabolic Disorders

Diabetes Mellitus
Hypoglycemia
Acute Renal Disease

Respiratory Disorders

Dyspnea at Rest
$FEV_1 < 60\%$
Severe Pulmonary Vascular Disease

to make more precise exercise prescriptions for individual participants.

There are several exercise-testing protocols that are both valid and reliable for adolescents (e.g., modified Balke Treadmill Protocol). The reader is referred to the ACSM's *Guidelines for Exercise Testing and Prescription (2000)* for the details of commonly used protocols. These laboratory tests should require work that involves large muscle groups; work that is measurable, reproducible, and tolerable; and work stages that are progressively graded. Although it is also recommended that the mode of exercise tested reflect the type of exercise expected to play a large role in the exercise prescription, treadmill protocols have been found to be the safest and most appropriate mode of testing when physical maturation is ongoing.

Physiological measures, particularly heart rate, are monitored during most exercise tests. Unless directly assessed through respiratory gas analysis, this physiological data, along with personal physical data (e.g., age, weight), is used in prediction equations to estimate VO_{2max}. This estimate of functional capacity is usually expressed relative to body weight so that comparisons can be made between individuals based on criterion-referenced fitness standards (see Table 3). This comparative assessment is then used as a prescription guide for both volume and intensity. Because there is a generally linear relationship between oxygen consumption (directly related to exercise intensity) and both heart rate (see Figure 1) and rating of perceived exertion, and it is relatively impractical to assess VO_2 during exercise, heart rate methods and ratings of perceived exertion have often been used to prescribe and monitor exercise intensity level.

Table 3. Aerobic capacity (VO_{2max}) classification based on gender and age.

	Men Ages 13-19	Women Ages 13-19
Very Poor	<35.0	<25.0
Poor	35.0-38.3	25.0-30.9
Fair	38.4-45.1	31.0-34.9
Good	45.2-50.9	35.0-38.9
Excellent	51.0-55.9	39.0-41.9
Superior	>56.0	>42.0

•values are in $ml \cdot kg^{-1} \cdot min^{-1}$

Data from Cooper, K. (1982). *The Aerobics Way*. New York: Bantam Books, Inc.

Unfortunately, precise fitness standards for aerobic capacity of adolescents are difficult to determine due primarily to individual differences in growth rate. However, the Institute of Aerobic Research (1987) has developed a set of *Fitnessgram* standards that identify a "healthy fitness zone" for age-specific performance times in the 1-mile walk/run and for age-specific VO_{2max} (see Table 4). The 1-mile (1,600 m) run/walk is a cardiorespiratory field test that has been used often in fitness screening of children and adolescents ages 5-17. In addition to the *Fitnessgram*, this test is also used by the Physical Best Program (AAPHERD, 1988) and in national youth fitness studies (Ross and Pate, 1987). Using time to complete this test and other individual variables, one can make a comparison to normative values for time and VO_{2max}. VO_{2max} can be predicted with the following equation (for ages 8-17) (Cureton et al., 1995):

$$VO_{2max} = 108.94 - 8.41(\text{time in minutes}) + 0.34(\text{time in minutes})^2 + 0.21(\text{age x gender}) - 0.84(\text{BMI})$$

where:
- VO_{2max} is in $ml \cdot kg^{-1} \cdot min^{-1}$
- time is determined in minute decimal units

Figure 1. Relationship between oxygen consumption and heart rate

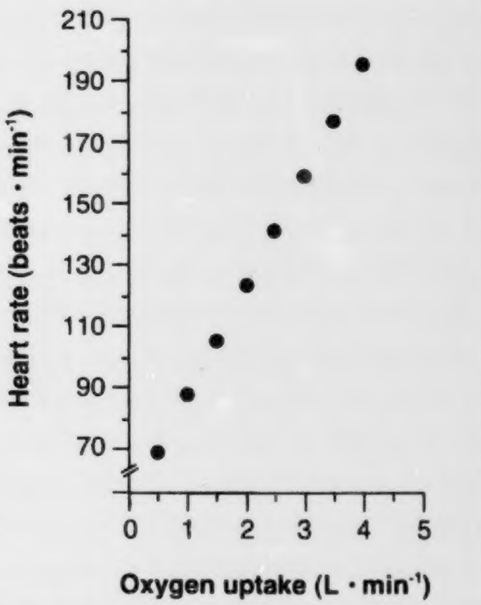


Table 4. The Prudential FITNESSGRAM: Standards for Healthy Fitness Zone (HFZ).

GIRLS					BOYS				
Age	**1-mile (min:sec)**		**VO$_{2max}$ (ml/kg/min)**		**Age**	**1-mile (min:sec)**		**VO$_{2max}$ (ml/kg/min)**	
10	12:30	9:30	39	47	10	11:30	9:00	42	52
11	12:00	9:00	38	46	11	11:00	8:30	42	52
12	12:00	9:00	37	45	12	10:30	8:00	42	52
13	11:30	9:00	36	44	13	10:00	7:30	42	52
14	11:00	8:30	35	43	14	9:30	7:00	42	52
15	10:30	8:00	35	43	15	9:00	7:00	42	52
16	10:00	8:00	35	43	16	8:30	7:00	42	52
17	10:00	8:00	35	43	17	8:30	7:00	42	52
17+	10:00	8:00	35	43	17+	8:30	7:00	42	52

* For both the 1-mile times and the VO$_{2max}$ values, the number on the left represents the lower end of HFZ, while the number on the right represents the upper end of HFZ.

Criterion-referenced standards developed by the Institute for Aerobic Research, Dallas, 1987.

- for gender, substitute 1 for male and 0 for female
- BMI = body mass index or body weight in kg/height^2 in m

Components of an Effective Aerobic Fitness Program

Cardiorespiratory endurance can best be improved by regular participation in aerobic exercise. As noted above, aerobic activities are those that increase the body's rate of oxidative metabolism for prolonged periods, as well as cause a sustained increase in heart rate throughout the exercise bout. Table 5 lists aerobic activities that generally can be sustained at a constant intensity for extended periods, though sustaining some activities is dependent on skill. In designing an exercise program, participants should combine activities that they enjoy for practicality and adherence.

After selecting activities of interest, it is important to apply the following set of guidelines in creating an exercise program. These components of prescription, properly combined, will successfully promote health, safety, and physical fitness. In that these components are interdependent by nature, similar conditioning effects can be achieved with many different combinations as long as the weekly total activity is comparable.

Table 5. Sustainable modes of aerobic exercise.

Aerobic dance/step
Cycling
In-line skating
Jogging/running
Nordic skiing
Rowing
Stairclimbing
Swimming
Walking/hiking

1. **Frequency of exercise.** Aerobic exercise should be performed 3-5 days a week. Frequency should reflect the fitness of the individual as well as the intensity and duration components of prescription. Especially when beginning a program, participants are encouraged to exercise every other day to allow for both recovery and adaptations to the new physical demands. As fitness level increases, frequency may be increased to five or more times per week to elicit continued improvement. Total work performed per week is more important than are the characteristics of (or the number of) individual sessions in stimulating increased fitness. Once the desired level of fitness has been achieved, frequency can be reduced to 2-4 times per week as long as the intensity and duration of the exercise bouts performed are similar to those used to achieve the current fitness level.
2. **Intensity of exercise.** If cardiorespiratory fitness is to be achieved, exercise must be performed at a level of intensity or energy expenditure that is sufficient to stimulate physiological adaptations. Simply put, if there is no demand on the aerobic system to improve, it will not. Though this is the

most difficult component to determine, a general guideline is for the individual to attempt to work within a moderate-to-vigorous range of intensity that is specific to his/her level of fitness.

Since a relatively strong correlation has been found between certain physiological or psychophysical markers and actual energy expenditure, these markers have been used to monitor intensity during exercise. Two valid and reliable approaches to monitoring effort are the Karvonen heart rate (%HRR) and the Borg's ratings of perceived exertion (RPE) methods. In the heart rate method, the pulse is taken at either the radial or carotid arteries to measure beats per minute (see Figure 2) or a heart rate monitor may be worn. A target heart rate range is established for each individual based on resting heart rate and the heart rate range between resting and maximal values (HRR) (see Table 6 for procedures). The ACSM guidelines suggest taking 50-85% of HRR and adding these calculated values to resting heart rate for target heart rate range. If the individual is very unfit, it is acceptable to begin the range at 40% of HRR. Because $\%VO_{2max}$ is directly related to %HRR, using the latter to predict exercise intensity is considered quite reliable. It should be noted, though, that the estimation of maximal heart rate (using age as a predictor) may produce errors in generating relative intensities for some individuals. A considerable percentage of the population falls either below or above age-estimated maximal heart rates, and therefore, some amount of flexibility must be applied to individual target heart rate ranges.

Borg's RPE method reflects the individual's subjective ratings of exertion during exercise (Borg, 1998). Ratings of perceived exertion have often been used as an adjunct to heart rate in monitoring exercise intensity, but once the relationship between heart rate and RPE are established, RPE can be used alone. This method is most reliable in steady-state aerobic exercise and would be difficult to use effectively in activities where intensity varied constantly (e.g., soccer, basketball).

When beginning an aerobic-training program, it is often necessary to experiment to determine the exercise load that will elicit the chosen target intensity. As shown in Figure 1, heart rate tends to elevate as workload increases. By checking heart rate or RPE at multiple levels

Figure 2. Heart rate, as monitored by palpation of the radial artery (at the wrist) or carotid artery (at the neck), can be a useful guide to exercise intensity

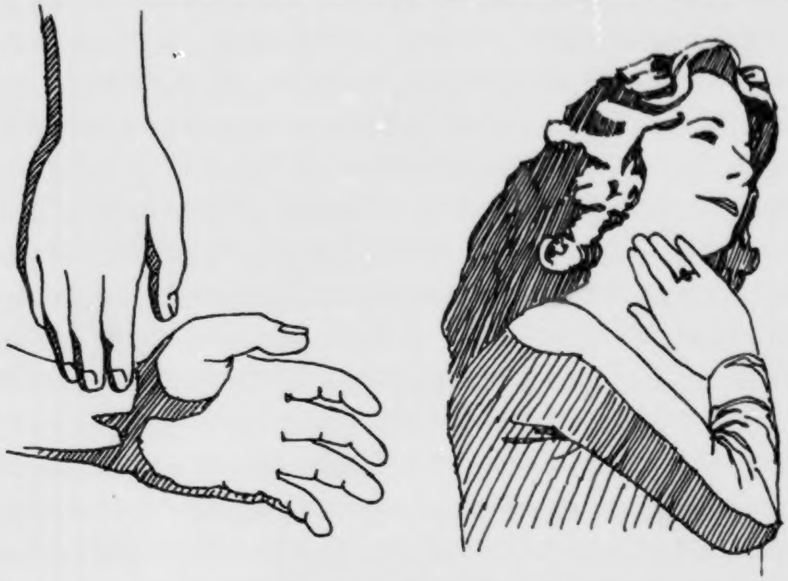


Table 6. Computation of heart rate range for aerobic exercise training.

Step 1

Measure resting heart rate (best to do this just after waking in the morning)

Step 2

Estimate individual maximum heart rate:

$HR_{max} = 210 - .5$ (age in yrs)

Step 3

Compute lower limit for training heart rate range.

$[(HR_{max}$ - resting heart rate) $* .50] +$ resting heart rate

Step 4

Compute upper limit for training heart rate range

$[(HR_{max}$ - resting heart rate) $* .85] +$ resting heart rate

Example

A 20-year-old woman with a predicted HR_{max} of 200 and a resting heart rate of 60 would have a training heart rate range (based on 50% and 85% of HRR) of 130-179 beats/min.

Lower limit $[(200-60) * .5] + 60 = 130$

Upper limit $[(200-60) * .85] + 60 = 179$

of exercise demand, identification of specific workloads that produce the desired training effects can be made. Note that these workloads may have to be adjusted as fitness increases to maintain relative intensities.

3. **Duration of exercise.** ACSM guidelines suggest 20-60 minutes of continuous or intermittent aerobic exercise to improve functional capacity. Having identified the appropriate intensity range, participants often find it difficult to meet the recommended guidelines for duration at the beginning of an aerobic exercise program. Intermittent exercise (with a minimum of 10-minute bouts) paired with recovery periods have been found to be similarly effective if total volume is the same. Alternation of higher and lower intensities within the target range can be used to meet duration recommendations as well.

   Because the goal is to create progression in energy expenditure, appropriate combinations of intensity and duration must be determined in a manner that accounts for increases in fitness. For most participants, 20-30 minutes of 50-60% HRR (RPE of 3-4) should be attempted for the first few weeks, and thereafter, assuming no complications, duration should be increased *before* intensity.

4. **Warm-up and cooldown.** Each training session should begin with light aerobic activity that stimulates major joints and muscle groups. This allows the body to gradually increase body temperature and blood flow to working cardiac and skeletal muscles while decreasing the chance of injury. The warm-up should last about 5-10 minutes. Once the aerobic conditioning session has been completed, it is important to continue the aerobic activity at a low intensity for approximately five minutes. This prevents pooling of blood in the extremities, reducing the chance of dizziness or fainting. This cooldown also enhances the recovery process by stimulating continued blood flow to the fatigued muscles, delivering nutrients and carrying away metabolic waste products. *Static stretching* exercises are generally most beneficial in the cooldown period, both improving flexibility and reducing muscle soreness.

5. **Progression.** Evidence shows that physiological changes associated with aerobic training enable increases in total work performed in the training week. Cardiorespiratory endurance may increase as much as 3% per week for the first month, 2% per week in the second month, and 1% per week thereafter. To continue improvements, the aerobic system must be stimulated to adapt by adjusting frequency, intensity, and duration of exercise. There are three stages of progression for most participants. The first is the *initial conditioning stage* and varies in length depending on the rate of adaptation. Initial intensity is set at 40-60% HRR for 15-20 minutes. Fit, active individuals can generally skip this stage. The *improvement stage* usually extends for 4-5 months with a more rapid rate of progression. Exercise frequency, intensity, and duration are increased gradually but *independently*. When the desired fitness level has been achieved, the *maintenance stage* begins, usually about 6 months into the program. The acquired fitness level can be maintained with a frequency of 2-4 sessions per week as long as the exercise bouts are of a similar intensity and duration as those performed in achieving that level of fitness. With long-term fitness, individual objectives often

change, and the program may have to be adjusted to meet new goals.

Table 7 summarizes the current recommendations for each of the components of an aerobic fitness program, and Table 8 summarizes four important principles of training that provide a conceptual approach to exercise prescription.

Adaptations to Aerobic Exercise Training

The repeated stimulation of aerobic exercise will induce physiological adaptations that are collectively known as "training effects." These adaptations carry important benefits in terms of both aerobic fitness and overall health. Cardiorespiratory exercise training improves performance by increasing the capacity to exercise at vigorous levels *and* by reducing the relative intensity or stress of moderate exercise. For example, as one becomes more aerobically fit, a running pace that once elevated heart rate to near maximal levels and quickly led to exhaustion will be tolerated with less fatigue and a decreased heart rate response. Alternatively, with fitness, it is probable that an increased pace will be required to elicit the same %HRR.

These physiological improvements are known to occur in the cardiorespiratory, musculoskeletal, and neuromuscular systems. The cardiovascular system adapts so that the heart becomes a more powerful and efficient pump. As heart size and volume increase, so does blood volume and, consequently, stroke volume (i.e., volume of blood pumped with each contraction of the heart muscle). This positively affects maximal cardiac output during very intense exercise, allowing greater delivery of blood and nutrients and an enhancement of endurance at these levels. Resting and submaximal exercise heart rates are also decreased because adequate blood volume is delivered with fewer heart contractions per minute. Lung volume is increased, allowing for a greater oxygen-exchange surface area, and the oxygen-carrying capacity of blood is also enhanced with aerobic fitness.

Skeletal muscle that has been trained also shows adaptation to the exercise demand. Working muscle becomes more capable of extracting oxygen from the increasingly dense capillary beds delivering blood to the individual muscle fibers. Within the muscle cell, enhancements in energy uptake and storage, oxidative metabolism, and connective tissue architecture result in greater force capacity and endurance. These improvements allow for a greater production of energy during exhaustive exercise while decreasing the production of exercise-limiting metabolic waste products (e.g., lactic acid) in submaximal exercise. Neuromuscular stimulation also becomes more efficient in both turning "on" and turning "off" muscular contraction, as well as generating more precise sequences of muscle activation (i.e., fine-tuning of force output). The overall effect of these physiological adaptations is a greatly improved capacity to perform aerobic exercise for longer durations and with more intensity.

Injury Prevention

Exercise stresses the body, and the novice participant is at increased risk for developing certain muscle, bone, and joint injuries. Fortunately, injury risk can be minimized by adherence to the exercise prescription guidelines described above. Nonetheless, some precaution is advised. The following are common causes of injury among beginning exercisers:

1. **Misinformation.** Lack of understanding of the proper use of exercise equipment often leads to unnecessary injury. Also, many exercise

Table 7. Components of an aerobic fitness program.

Component	Recommended Dose
Mode	Rhythmic, large-muscle group activities, e.g., walking, jogging/running, cycling, swimming, rowing, aerobic dance/step
Intensity	50-85% of Heart Rate Range (HRR) 3-6 on revised RPE scale
Duration	20-60 minutes per session
Frequency	3-5 days per week
Progression	Initial Phase (4-6 weeks) – low intensity and duration, minimum of 3 days per week Improvement Phase (5-20 weeks) – moderate to higher intensity and duration, increase frequency to 5 days per week Maintenance Phase (long-term) – moderate to higher intensity and duration, 2-4 days per week

Table 8. Principles of training.

OVERLOAD - If the body is not required to adapt, it won't. Use a safe, effective training program that progressively overloads the body and allows adequate time for adaptation at each level of stimulation. The upper limit of overload is the amount of activity that requires more adaptation than is possible or safe.

SPECIFICITY – The effects of training are specific to those segments or systems of the body that are overloaded.

REVERSIBILITY – The effects of training are transient and reversible.

MAINTENANCE – It takes less time and effort to maintain fitness than to attain it.

regimens or aids that are advertised as "short-cuts" to fitness are usually unrealistic and potentially unsafe.

2. **Overuse.** Some individuals will attempt to advance their training program too rapidly, pushing their bodies beyond safe limits. Injuries that result will necessitate a decrease in activity level and often lead to a reversal in fitness. A key to injury prevention is proper progression in the exercise program.
3. **Competing with others.** The type and intensity of activity attempted by beginning exercisers should be dictated by individual fitness levels. Competing with more physically fit individuals will often lead to overexertion types of injuries.

Environmental Concerns

Extreme environmental conditions present potentially dangerous conditions for exercise. The factors most potentially health-threatening are heat and/or humidity stress. Heat generated from exercise in combination with environmental heat can increase the risk of excessive body heat storage (i.e., *hyperthermia*). Hyperthermia is further increased in a humid environment where the body is unable to cool itself through the evaporation of sweat from the skin's surface. Prolonged submaximal exercise in hot and/or humid conditions can increase the sweat rate to 2-3 liters per hour, which often leads to *dehydration* in addition to hyperthermia. When the body is both hyperthermic and dehydrated, the heart's ability to pump blood throughout the body is compromised because there is a sharp decrease in blood volume (due to the large loss of body water in sweat). And because this decreased blood flow is not adequately supplying the brain, symptoms such as dizziness, confusion, and extreme fatigue occur. This state of *heat exhaustion* is dangerous and, if left untreated, could lead to life-threatening *heatstroke*.

Twenty-five percent of the healthy population is heat intolerant in a non-acclimatized state, decreasing to 2% with acclimatization. The best method to acclimatize is to aerobically exercise in a hot environment, gradually increasing duration while maintaining intensity at a more moderate level. It generally takes about 10-14 days to fully acclimate if properly progressing. Adequate hydration is very important in this process because as little as a 2% percent reduction in body weight due to sweat loss can result in impaired thermoregulation, central nervous system dysfunction, and decreased metabolic activity. Because the "thirst" sensation lags behind actual need for fluids, prevention of dehydration is accomplished by drinking fluids *before*, *during*, and *after* exercise in amounts that are more than thirst dictates. During the acclimation process to heat and/or humidity, outdoor exercise should be limited to early morning or evening. Light-colored clothing that "wicks" sweat is also suggested.

Cold stress is less risky if appropriate clothing is worn and body heat is generated through aerobic exercise. The amount of clothing needed to maintain thermal balance in the body decreases with the increasing intensity of exercise. Layering of clothing will allow for the removal of pieces as exercise progresses and the body produces greater amounts of heat. There is, nonetheless, a risk of *hypothermia* (i.e., excessively low body temperature) in very cold temperatures, especially if there is air movement (i.e., windchill), or if the body is wet. Symptoms of developing hypothermia include weakness, fatigue, decreased shivering, and loss of communication skills. This condition can also be life threatening and must be treated immediately. Frostbite is an exposure injury that can occur in extreme cold conditions; to prevent it, precautions should be taken to cover the hands, feet, and head sufficiently.

Modes of Aerobic Exercise

Many specific modes of activity can be used in a program designed to enhance aerobic fitness. The activities listed in Table 5 are considered aerobic because they are sustainable and involve increased rates of oxidative metabolism. In selecting an activity or set of activities, it is useful to choose those that

are found to be accessible and enjoyable. As well, these activities should be both safe and effective in producing training effects. Following are brief discussions of several commonly used aerobic exercise activities: jogging/running, walking, aerobic dance/step, and cycling. For each activity, recommendations are made to enhance the safety and enjoyment of aerobic exercise.

Jogging/Running

Jogging is a familiar activity that requires minimal skill development because locomotion movements are not only "hardwired" in our spinal cords, but also practiced from early childhood. Jogging, defined as slow running, is similar to running in that both feet leave the ground during some point in each stride (i.e., nonsupport phase). As speed increases, the amount of time spent in the nonsupport phase increases. Jogging/running speed depends on two variables, stride length and stride rate. Increases in either or both will increase running speed. Though not independent of each other, increasing stride rate will present a relatively greater cardiorespiratory stimulant, whereas increasing stride length will generally place more demand on the joints and musculature.

There are many different individual styles of jogging or running, all of which share the following common principles:

1. In jogging/running, as the foot comes forward to strike the ground, the heel should make contact first. The remainder of the front of the foot follows through, with a slight shift in weight load toward the large toe just before push off. Running "on the toes" or striking the ground first with the ball of the foot should be avoided because this technique will lead to soreness and muscle/tendon injuries.
2. The jogger/runner should generally maintain an erect posture, avoiding excessive leaning in either the forward or rearward directions. The muscles of the trunk and neck should be as relaxed as possible.
3. The arms should be kept at a low carriage and should be permitted to move in an easy manner. The arms, hands, and fingers should be kept relaxed.
4. In jogging/running, only moderate knee-lift is required. This is in contrast to the high knee-lift demonstrated by sprinters. The latter motion would be inefficient in prolonged activity.
5. The jogger/runner should breathe in a relaxed, natural manner. Most joggers will quickly acquire a natural running stride-to-breathing pattern. Conscious regulation of breathing is not necessary in most cases, though it is helpful to breathe through both the nose and the mouth.

Table 9. Suggested jogging program for previously sedentary beginners.

Frequency of exercise is 3 days per week on nonconsecutive days.

Week	Activity	Duration	Intensity (%HRR)
1	Walk	15 min	50-65
2	Walk	20 min	50-65
3	Walk	20 min	50-65
4	Walk/Jog	20 min	60-70
5	Walk/Jog	25 min	60-70
6	Walk/Jog	25 min	60-70
7	Walk/Jog	25-30 min	65-75
8	Walk/Jog	25-30 min	65-75
9	Jog	30 min	65-75
10	Jog	30 min	70-80
11	Jog	30 min	70-80
12	Jog	30 min	70-80

Table 10. Suggested jogging program for previously moderately active beginners.

Frequency of exercise is 3 or more days per week.

Week	Activity	Duration	Intensity (%HRR)
1	Walk	20 min	60-70
2	Walk	25 min	60-70
3	Walk	25 min	60-70
4	Walk/Jog	25 min	65-75
5	Walk/Jog	30 min	65-75
6	Walk/Jog	30 min	65-75
7	Walk/Jog	30-35min	70-80
8	Walk/Jog	30-35 min	70-80
9	Jog	30-35 min	70-80
10	Jog	35 min+	75-85
11	Jog	35 min+	75-85
12	Jog	35 min+	75-85

Advantages of Jogging/Running

Jogging and running enjoy widespread popularity as a mode of aerobic activity. Because this fundamental movement pattern is perfected during childhood, nearly everyone can perform this activity. It is a relatively inexpensive mode of exercise, with the cost of proper running shoes being the only necessary expense. This is an activity that can be done alone or with any number of other people, and it can be performed almost anywhere. With proper clothing, outside jogging or running can be done year-round in the United States.

Tips for the Beginning Jogger/Runner

Because the body must become accustomed to the exercise stress of jogging or running, the program should increase in demand over time. Most participants can readily adapt, but if exercise is increased too quickly, injury, illness, perceived lack of improvement, and/or attrition may result. Perseverance and self-discipline are essential ingredients for success in attaining fitness. It should be expected that a certain amount of discomfort, and possibly discouragement, will be experienced in the initial phase of a conditioning program.

Though no one shoe will meet the needs of all joggers or runners, a good running shoe will both reduce the impact force and control for or maintain the normal motion of the foot. Following are some qualities to look for in a running shoe:

- Moderately elevated and slightly flared heel with good shock-absorbing qualities
- Well-padded heel box that fits with little or no slippage
- Provides appropriate stability, especially with regard to rearfoot motion
- Deep enough toe box to avoid toe contact with the front of the shoe during running
- Good arch support
- Sturdy, durable outer sole for greater mileage
- Snug forefront part of shoe to decrease lateral (i.e., to the outside) foot motion

Table 9, a suggested beginning jogging program, illustrates the importance of beginning gradually and includes some walking in the early weeks. This strategy will greatly reduce the risk of injury while adjusting to the exercise demand. Table 10 gives a suggested jogging program for those with previous aerobic training.

Walking

Walking is enjoying widespread popularity as a means to improve aerobic health and fitness. Walking shares most of the same advantages as jogging and running. Because at least one foot is always in contact with the ground (i.e., support phase), walking can be characterized as an alternating sequence of single and double support. The potential for speed of locomotion is obviously decreased in walking because there is no flight or nonsupport phase involved. The resulting lower risk of orthopedic injuries is appealing for many, as well as the potential social opportunity this activity provides. Walking can be done indoors or in almost any outdoor environment.

Tips for Beginners

Table 11 provides a sample aerobic walking program for three different levels of initial fitness. Gradual progression is the key to success once again. Proper walking shoes are important in preventing foot and muscle soreness or injuries. The following are features to look for in a walking shoe:

- Lightweight and durable
- Adequate heel cushion, thick outer sole, and slightly elevated heel
- Protection against excessive pronation (i.e., inward roll) of the foot
- Slightly stiff to allow for an efficient, yet comfortable, transfer of body weight from the heel to the ball of the foot during footstrike
- Well-supported arch and ample room in toe box

Aerobic Dance/Step

There are many forms of this activity, usually presented in a class structure in fitness facilities or in video form to follow at home. Variations in experience level required, intensity or impact levels, music type, pace, body segments trained, workout environment, and rest interval length are all seen in the myriad of approaches to this type of aerobic fitness exercise. There are class or videotape workouts to meet everyone's needs and preferences. Studies have documented the physiological benefits of aerobic dance and step workouts, which include increases in VO_{2max}, decreases in both resting heart rate and heart rate at standard submaximal exercise intensities, decreased perceived exertion ratings at a given submaximal intensity, improved skinfold measurements of body fat, and decreased total serum cholesterol.

Table 11. Suggested walking programs for low, moderate, and higher initial levels of fitness.

	Low			Moderate			Higher		
	Miles	%HRR	Pace	Miles	%HRR	Pace	Miles	%HRR	Pace
Initial Phase (3 days per week; 10 min warm-up; 10 min cooldown)									
Weeks 1-4	1.5	40	24min/m	2.0	50	20min/m	3.0	60	17min/m
Improvement Phase (3-4 days per week; 10 min warm-up; 10 min cool-down)									
Week 5	2.0	40	24min/m	2.5	50	20min/m	3.5	60	17min/m
Week 6	2.0	40	24min/m	2.5	50	20min/m	3.5	60	17min/m
Week 7	2.0	40	24min/m	2.5	50	20min/m	3.5	60	17min/m
Week 8	2.0	40	24min/m	2.5	50	20min/m	3.5	60	17min/m
Week 9	2.5	40	23min/m	3.0	50	19min/m	4.0	60	16min/m
Week 10	2.75	40	22min/m	3.25	50	19min/m	4.0	60	16min/m
Week 11	2.75	40	22min/m	3.25	50	19min/m	4.0	60	16min/m
Week 12	2.75	40	22min/m	3.25	50	19min/m	4.0	60	16min/m
Week 13	3.0	40	22min/m	3.5	50	18min/m	4.5	60	15min/m
Week 14	3.0	40	22min/m	3.5	50	18min/m	4.5	60	15min/m
Week 15	3.0	40	21min/m	3.5	50	17min/m	4.5	60	14min/m

A typical aerobic dance or step workout consists of 8-10 minutes of warm-up activity followed by 15 to 45 minutes of aerobic dance/step at the target training intensity and a 10-minute cooldown. Heart rates and/or RPE should be monitored at intervals throughout the workout to ensure the maintenance of target intensity. Handheld weights can be used to increase the exercise intensity. Of concern in this type of activity is the degree of impact experienced in the joint systems. It is suggested that "low impact" (one foot is always in contact with the floor) versions of this activity be attempted in the initial phases of conditioning, improving the strength and resiliency of the musculoskeletal system before progressing to "higher impact" demands. Water aerobic activity is very beneficial in the rehabilitation of injuries and for those who are beginning their program with very low fitness, but variations in the characteristics of movements performed can stimulate training effects even in the very fit. For those working out of the water, proper footwear is again an essential investment in health and safety. Aerobic dance/step shoes should have the following characteristics:

- Flexible and durable outer sole
- Shock-absorbing midsole and inner sole
- Large toe box
- Well-cushioned forefoot area
- Good arch support
- Solid, firm heel counter
- Comfort and stability (ankle support)

Cycling

Cycling exercise is extremely popular worldwide and has been shown to stimulate physiological improvements that are comparable to running and walking if total exercise volume is held constant. Continuous aerobic effort within the target range can be maintained fairly consistently throughout the cycling bout with a moderate degree of training. Mechanical efficiency in the performance of the cycling activity will enhance safety, enjoyment, and the training effects of this exercise mode. Therefore, it is advisable to seek knowledgeable guidance in both the positioning of the body on the bicycle and proper pedaling technique. Local bicycle shops and bicycle clubs are good sources for this information. Although much of the aerobic demand is placed on the lower body (i.e., hips and legs), good cycling form requires strong low back and abdominal muscles as well as overall flexibility and stability. Different terrains will encourage variations in riding technique, which will result in muscle groups being stimulated in different patterns.

Minimal costs include cycling shoes with stiff soles for good transfer of force into the pedals, cycling shorts and gloves with adequate padding, a cycling helmet that meets safety standards, and a safe and properly-

Table 12. Suggested cycling program for beginning cyclists.

Frequency of exercise is 3 days per week on nonconsecutive days

Week	Duration	Intensity (%HRR)	Pedal rate (rpm)
1	20 min	50-60	60-70
2	25 min	50-60	60-70
3	30 min	50-60	60-70
4	30 min	60-70	70-80
5	35 min	60-70	70-80
6	35 min	60-70	70-80
7	35 min	65-75	75-85
8	35 min	65-75	75-85
9	40 min	65-75	75-85
10	40 min	70-80	80-90
11	45 min	70-80	80-90
12	50 min	70-80	85-95
13	50 min	75-85	85-95
14	55 min	75-85	85-95
15	60 min	75-85	85-95

sized bicycle. Though cycling can carry a high initial price tag, the equipment necessary is typically quite durable, often lasting for years. And because cycling activity does not require the same type of weight bearing as do running or aerobic dance, it is considered low impact and valued as an activity that can be enjoyed for an entire lifetime. Table 12 gives a suggested cycling program for beginning cyclists.

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CHAPTER 3

Learning Motor Skills

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A lot of people think that you are either born capable of participating in many different physical activities or you are not. For many, the idea that "I am not good at that" usually means, "I am not capable of being good at that." Fortunately, people who think that you are either good or not good based on the abilities you are born with are mostly *wrong*. Although it is true that few of us are capable of reaching Olympic performance levels, it is also true that, with very few exceptions, all of us are capable of acquiring enough ability in most sports and physical activities to make participation enjoyable. What is really important is that we do not let the idea that we cannot all be world-class performers at an activity prevent us from participating in that activity.

It is really important that we develop interest in participating in a variety of physical activities not only from a health perspective but also because participating in physical activities is fun. Some of you may want to pursue high levels of ability as varsity or club athletes, some of you may want to pursue activities you can do with your friends or family, and some of you may be looking to pursue an activity you can do as an adult. As you get older, your interests in different kinds of physical activities will change; you will want to be able to pursue those interests, even if they include some activities with which you have had little experience. Knowing how people get better at and learn motor skills will help you pursue a lifetime of physical activity.

You cannot be afraid to be a beginner at physical activities. To do so is to limit your experiences and the fullness of your life. People who are better than we are at physical skills are usually those people who have had a lot more experience with that activity. It is hard to be a beginner at an activity, particularly when others who are not beginners surround you. We are usually afraid to let others know that not only can't we do something but, many times, we don't even know what we are trying to do. What is really important is that we do not let the idea that we are not as good, and perhaps may be a real beginner at an activity, get in the way of our pursuing that activity. You cannot be afraid to go through all those parts of being a beginner that most of us don't like. So what activities do you want to learn to do? What activities do you want to try, and what activities do you want to learn how to do better?

This chapter is designed to give you information on how you get better at motor skills. For many activities, you may have a teacher, coach, or instructor to help you. For others, you may not. Regardless, knowing how you get better at motor skills can help you approach both skill improvements and learning new activities a lot more successfully.

Physical Abilities and Getting Older

Most of you have probably noticed that as you have grown through school you have gotten better at performing many motor skills. This is due to several factors. First, you have increased your physical abilities. Your muscular system can generate more force, and your heart and lungs are much more efficient in helping you sustain activity for longer periods of time. Second, you have increased your physical stature. You have gotten bigger, and your physical size allows you to do more. Third, you have learned many motor skills that will help you learn more complex motor skills.

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You have had a lot of practice at basic skills and have even learned many complex ones that will help you learn others.

How big you are in terms of your height and your weight does affect your success in physical skills. Success in basketball and volleyball will be easier if you are very tall. Success in gymnastics will be easier for people who are shorter and not as heavy as most of us. The important thing is that all of us can enjoy playing basketball even though we are not as tall as an NBA player, and all of us can enjoy gymnastics even though we are not 5 feet tall and weigh 100 pounds. Because we cannot be as good as someone who has a body build ideally suited for an activity does not mean that we cannot become skillful enough at the activity to make it enjoyable for ourselves. Our physical size should not be a deterrent to participation in a variety of activities.

As you have become older, you have also grown bigger and stronger. You have probably found that you are capable of doing many skills better just because you are bigger and stronger. This is true particularly for those skills such as throwing, kicking, and striking that require you to generate force to move objects such as balls. It is also true for skills that require you to do things like jump and run. We expect 12-year-olds to do better than 8-year-olds in many physical skills just because they are bigger and stronger. Some of you who have reached the high school level have grown about as tall as you are going to get, but many of you have not. Many of you have not physically developed to your optimum level, particularly boys, who tend to develop physically later than girls. Some of you may have started to put on more weight than you should. Being overweight will probably negatively affect your ability to perform motor skills, and, because you are not successful, you may begin to decrease your participation in physical activity.

You cannot change your height. If you are a 5'10" young man, you are unlikely to be 100 pounds. If you are a 5'5" young woman, it is unlikely that you will aspire to be 160 pounds so you can be heavier and throw a ball further. However, physically conditioning the body you have to perform at its optimum level will affect your performance in physical skills. That's why there is so much emphasis now, even at the high school level, on weight training and other types of physical conditioning. There is also a lot of specialization in conditioning for different activities for those people who want to participate in an activity at a high level. The physical abilities necessary to be a lineman on the football team are not the same physical abilities necessary to be a golf or tennis player. Knowing what physical abilities are critical for an activity you may want to participate in can help you target a conditioning program. Those of us who want to just participate in an activity at a "participant level" and have enough competence to make the activity enjoyable need to keep our bodies generally conditioned and have enough physical ability in the activity to make participation safe.

Girls and Boys and Motor Skills

Up until the time that girls and boys reach puberty and take on the sexual characteristics of an adult, there are few physical differences between boys and girls that would affect their performance in motor skills. This means that there is no physical reason why boys should be better at performing motor skills than girls. Although there are girls who perform better than boys and boys who do not perform as well as girls, many boys perform motor skills, particularly those related to sports, better than most girls.

When girls and boys reach puberty, real physical changes between girls and boys affect their levels of performance. As boys grow into adulthood, they tend to put on muscle mass, which makes them stronger. As girls grow into adulthood, they tend to put on body fat, which has the potential to make them relatively less strong proportionate to their body weight.

Particularly alarming is the idea that as girls get older they participate less in physical activity. We now know how critical lifetime participation in physical activity is to maintain health. When girls stop being participants, they are putting their health at risk. Most of the differences in skill level before puberty and participation in physical activity after puberty are usually attributed to the way in which boys and girls are brought up in our society. Boys are encouraged and even expected to do physical skills and be participants. Girls are often discouraged from being participants; they do not have as many opportunities for participation and are not expected to do well. Opportunities for participation in a lot of the activities that many girls are interested in are not as prevalent as activities boys might have more interest in. From a very early age, boys are provided opportunities for baseball and football by their communities.

Many physical education programs in school cater to activities that many girls and some boys have no interest in. There has been a lot of change in this area in recent years, but the inequities are still there. All of us can help by encouraging girls to be participants and by broadening the opportunities for many different kinds of physical activity for both girls and boys and for people of all ages.

What is Learning?

We have already talked about the role of growth and physical development as an important part of getting better at motor skills. You will also get better at motor skills when you have spent time learning that skill. Sometimes you can do a motor skill but cannot repeat it. We usually say that you have learned a motor skill when you can do it over and over again in a consistent manner and when, although time has passed between your performances of that motor skill, you still can do it.

When motor skills are learned, they are committed to long-term memory and are not easily forgotten. Many of you have heard the expression, "you never forget how to ride a bike." Many adults who have not ridden bicycles for many years can get on a bike and ride it fairly skillfully. That is because riding a bicycle was a motor skill that was learned and committed to long-term memory. If you have not really learned a motor skill, you will not be able to do it over time.

When we say a person has learned a motor skill, we usually mean that not only can they do it but they can do it well. When a person performs well, not only can the person accomplish the purpose of the movement (get the ball in the basket) but his or her movement becomes more mechanically efficient and coordinated. The person looks better and smoother doing the movement. A person who has learned a motor skill can focus on how to use the skill and on different parts of the skill and does not have to concentrate so hard on what he or she is doing in the physical performance of the skill.

How People Get Better at Motor Skills

There are several stages that a person passes through as they learn and become proficient at a motor skill. Knowing these stages will help you determine where you are in learning and will help you to know what you have to do to get better. These stages were developed by people who study how you develop motor skills (Fitts & Posner, 1967). They are described below with some suggestions about what to do at each stage to get better.

Stage One – Verbal-Cognitive Stage

At this very beginning stage of learning a motor skill, you are trying to figure out how to do the skill and will probably be taking a few beginning attempts at doing the skill. You will be concentrating very hard, and you will be very inconsistent in your responses. One time you may make one mistake, and another time you will make a different mistake.

What you need to do to get better

At this stage of learning, one of the most important things you need is to have an accurate and clear idea of how to do the skill you are trying to do. If you have an instructor, teacher, or coach, he or she will probably make sure that you have a good demonstration of how to do the skill and should give you several key ideas, called cues, to help you get started. What is helpful at this stage is for those ideas or cues to be brief and sequenced. The following cues are for a beginner learning how to throw a ball:

- Side orientation (to the target)
- Rotate back and lay out arm
- Step and throw

It is helpful, as you practice at this stage, to rehearse those cues in sequence.

Make sure that you are practicing in very simple conditions. Sometimes that means initially performing the movements without the ball or without the stick or bat in your hand. Rehearse how to do the skill and make sure that you have a very clear idea of what you are trying to do. You don't want anyone trying to take the ball away, and you don't want anything to interfere at this point with you getting a grasp on the movement itself.

If you do not have an instructor, teacher, or coach, you may want to use printed or media materials to help you learn a skill. There are many materials in the library or available over the Internet that can help you. Many commercial and professional organizations provide good free materials on different activities. Initially you should figure out what you are trying to do. What does each part of the movement involve? Where should each part of your body be at different stages of performing the skill? If you don't know, then seek the information you need.

You may start practice at a slower speed or may break apart a skill at first (such as practicing the toss

in the tennis serve without the ball). However, you should quickly move your practice to "real" speed and the whole skill rather than the practice of parts. Otherwise, you may be practicing the skills with the wrong timing.

At this beginning stage of the learning process, you can probably not use much feedback from others on what you are doing because your problems or errors are usually not consistent enough. You are likely not to make the same error twice, so being told what to correct is not too helpful. The help that you can use is clarification about what you are trying to do with the skill. You can pass through this stage of learning most skills quickly with a lot of good, concentrated practice.

Stage Two – The Motor Stage of Learning

When you are at Stage Two in learning a motor skill, you are at the stage where you are trying to put the skill together with some efficiency and "smoothness." You still need to concentrate on what you are doing but not to the extent that you had to in the first stage of learning. Your consistency will improve at this stage, and you will be able to start working through some of the finer points of your physical performance that make the difference between just getting through a skill and doing it well.

What you need to do to get better

You need a lot of good practice to get through this stage of learning. You are likely to be able to concentrate on improving only one part of the skill and not worrying so much about what you are doing with the other parts. This means that you will be able to focus your attention on refining your performance.

Once you are capable of doing skills in really easy conditions (such as dribbling without moving and without anyone else involved), you can start to practice in more difficult and more gamelike conditions (where a skill will be used in a game). Gradually increase the difficulty of your practice. If more than one skill is performed in a sequence, practice the sequence of skills together. We call this a progression of learning experiences; your success in learning will depend on how good a progression you use in your practice. A later section of this chapter deals with progressions in learning.

At Stage Two, you will be able to use help from others, or you may videotape your performance and do your own analysis of what you need to work on. Don't try to change too many things at one time because it will only be frustrating and unsuccessful. First make sure that the basics of the whole skill are there and then look to see which parts of the skill you need to improve most.

You will not get out of Stage Two of learning a motor skill until you can perform a skill well without thinking about it. For many of us, we never get out of this stage in learning a skill, but we still can participate in the activity. With practice, we just get closer to the point where we are pretty good and don't have to think about it at all.

Stage Three – The Automatic Stage

When you are able to perform a motor skill consistently well without thinking about it, you are in the automatic stage of learning. Most of us have reached this stage in basic living skills such as walking, running, writing, etc. We never have to give a thought to how we do these skills; they are just there when we need them. Highly skilled athletes are at this stage. In complex sports and team games such as basketball, players who reach this point with their motor skills have time to concentrate on what is happening in the game because they are not concerned with how to do the skill. At this stage, there should be very little cognitive involvement.

What you need to do to get better

At this stage, you will still need to practice the skills you want to learn in simpler conditions (such as in drills), but a large part of your practice should involve practicing the skill the way it is going to be used (gamelike or performance conditions). When more than one skill is used in a sequence, it is also important to practice the skills in combination. For baseball, for example, this means that you don't just practice hitting all the time—you also practice hitting and running to first base. In tennis, you practice serving and moving into position on the court.

Sometimes players drift into poor habits at this stage and need to go back to Stage One to refine their basic performance of a skill, but they should not stay very long at the more simple conditions of practice.

How Should I Practice?

Regardless of what you do, the single most important factor in whether you will learn a motor skill is the extent of your practice. The idea of "practice makes perfect" is true, or almost true. Actually it is *good* practice that makes perfect. If you're practicing a skill wrong, it is likely that you will learn it wrong. It is actually better to really concentrate on a few good trials of a skill than it is to race through doing something without attending to doing it well. Really concentrating will help you process what you are doing cognitively (in your head). There are some other factors related to practice that will help you make the best use of your time. These are described below:

Whole vs. Part Practice. Sometimes you may want to practice just part of a skill you are trying to learn, like the run into a broad jump in track and field. But, mostly, you should practice the whole skill unless there is a safety reason for just starting with a part of the skill (like a back handspring in gymnastics). If you do practice just a part of the skill, you should quickly put it back into the whole skill so you do not destroy the timing of the skill.

Transfer from One Skill to Another. Why do some people seem to be good at everything they try and seem to learn more quickly than others? Part of the answer to this question is that there are basic and fundamental movement skills that some people have learned better than others at an early age. Also, some skills we learn have transfer value to learning other skills. This means that learning one sport or activity can help you learn another. If you have played soccer, there are many things about soccer that are similar to trying to learn hockey or lacrosse. There are also a lot of things that are not the same. Actually, the things that are the same will make it easier to transfer from one sport to another, and the things that are different will make learning the second skill more difficult. If you play badminton, for instance, you hit the shuttlecock with a very flexible wrist. In tennis, you use a very firm wrist, and the fact that you have been a badminton player may make it initially difficult to learn a good tennis swing. However, the tactics for offense and defense and moving to meet an object in both sports are similar, which will be a positive transfer.

Transfer of Practice to the Game. Why do we always seem to do well in practice, but then, when we try to do something in a game, everything tends to fall apart? Part of the answer is that there is pressure in a game that makes it difficult for us to use skills that we have not practiced to an automatic stage. The less skilled you are at doing something, the more likely your performance will be negatively effected by having to perform in a game situation, particularly if that game is in front of others.

Part of the answer to why we don't do as well in a game as we do in practice is also that we have not practiced the skills in gamelike conditions. If all you do in practice of the forearm pass in volleyball is do a forearm pass from a light toss from a partner, you cannot expect to be able to do the skill from a hard serve that is coming over the net. You haven't practiced it that way.

How Should I Schedule Practice?

Initially you may profit from repetitive, rote practice of a skill until you see some consistency in your performance. Very quickly, however, you will find that you profit from shorter periods of repetition that you repeat more often. Practicing your serve in a net activity such as volleyball, badminton, or tennis for one hour at a time will probably not be as effective as practicing 10 minutes a day for 6 days. If you do only a few repetitions of the skill at a time and make sure that as you are practicing you are really processing and focusing on what you are doing, you will use your practice time much more wisely.

The Speed-Accuracy Tradeoff

There are many skills in complex sports that require you to produce a great deal of force but also require you to be accurate. The tennis and volleyball serves and soccer kicking and shooting are good examples of such skills. If you have ever played tennis or watched less skilled players play tennis, you know that if they miss the first serve, the second serve is likely to have a lot less force. This is because it is hard to serve a ball hard and still be accurate. The question becomes, "Should I practice to be accurate, or should I practice for force?" The answer is that after you have the idea of the skill (Stage One), you should make sure that you devote a good part of your practice to performing the skill with a great deal of force. You can gradually add demands for a high degree of accuracy.

Practicing to Develop a Kinesthetic Awareness of a Skill

All of us have a mechanism built into our bodies to provide our brains with an awareness of movement and where our body limbs are at all times. We call this kinesthetic awareness. It is kind of an internal feedback mechanism. Developing a high level of kinesthetic awareness is important in many skills but is very important in many individual skills that require

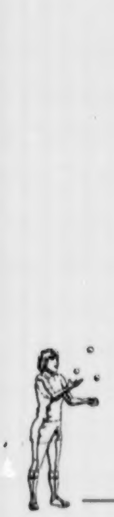
a great deal of balance. Kinesthetic awareness is very important in activities such as diving, ballet, and gymnastics, where a person is evaluated on the extent to which they have done a movement correctly. It is also important in many individual sports such as archery, bowling, and golf. Practice for these sports should focus on developing this kinesthetic awareness of what your body is doing so that you can more easily detect errors and "feel the movement."

Progressions for Practice

If you are trying to learn a skill on your own, or if you are trying to practice on your own without the help of a professional, you need to know how to order your learning and practice so that your practice is more successful. Certain skills need to be practiced in certain ways. Some ways of practicing are more difficult than other ways of practicing. You should try to practice things first in simple ways; then, when you are more successful, you can add more complexity and difficulty to your practice. The following ideas will help you decide the best way to practice different skills and will help you move from simpler conditions of practice to more difficult conditions of practice.

Putting Skills Together. Many skills that are used in activities that we participate in every day are used in a sequence with each other. We rarely just throw a ball; we catch and throw it. We rarely just shoot a soccer ball into a goal. We receive a pass and then we shoot it. We rarely just dribble a basketball. We dribble and pass. It is easier to practice skills initially when they are not sequenced. At beginning stages, it is important for you to plan your practice so that you are practicing skills separately, but it is important that, as soon as you can, you start practicing the skills you will use together in combination. In basketball or soccer, you should dribble and shoot, dribble and pass, and receive a pass and dribble. If, in a game, you will need to serve and move into position, then in practice you should serve and move into position.

Practicing for Open and Closed Skills. There are really two kinds of motor skills: those that we call **open skills** and those we call **closed skills**. Open skills are rarely performed in exactly the same way each time. When you are shooting a layup shot, you rarely approach it each time from the same spot or under the same conditions, so the actual performance of the layup shot is usually different each time. When you hit a tennis forehand, or participate in an activity like in-line skating, the same is true. Closed skills are different. In closed skills, you perform them in the same way each time. Gymnastics moves, a golf swing, archery, bowling, and diving are skills that are mostly closed in nature.



Because open and closed skills are very different in the way they are used, you have to practice them differently. If you want to be able to adapt what you do to very different conditions, you have to practice that way. If you want to "groove" the skill so that you can perform it the same way each time, you have to practice it that way.

To practice an open skill, you have to think about all the things you have to be able to do when you are actually using the skill and make sure you practice them. In in-line skating, for example, you know that you are going to have to be able to stop, turn, go fast and slow, go backwards and forwards, and change direction quickly. If you want to be able to do all of these things, then you need to practice them. If you want to be able to catch a ball in a game, and you know that you will have to be able to catch high balls, as well as grounders, line drives, balls you need to move backwards to get, and balls you need to charge, then you need to practice for all of those situations.

When practicing closed skills, you should keep everything the same. If you want to practice bowling for strikes, you should start at the very same point on the alley each time. You should start the skill exactly the same way each time, using the same preparation and the same approach. In closed skills, you want consistency. The foul shot in basketball is a good example of a closed skill. The player shoots from the same position each time; each player has his or her own way of getting set and making sure to be consistent. Some players even have rituals that they follow every time they shoot, like bouncing the ball three times and then shooting. They do this to maintain consistency in what they are doing.

Distance. It is almost always easier to do a skill when you don't have to produce a great deal of force or handle objects coming with a great deal of force. The distance you send an object or the distance an object comes from increases the force requirements. Practice serving, throwing, and striking from shorter distances first and then gradually increase the distance. Practice receiving balls from smaller distances before you try receiving them from longer distances. Practice shooting from smaller distances first and then increase the distance.

Size and Type of Equipment. Teachers of young children know that if they reduce the size of the equipment or make hard objects softer, the children are more capable of correctly learning to do the skills related to them. When learners of any age are put in situations where they are forced to incorrectly perform a skill because the equipment is too big or too heavy, or because the field or basket is too big or too high, they are likely to learn how to do the skill in the wrong way. If you find that you cannot handle the weight or size of equipment, then you need to consider modifying that equipment until you are more able to handle regulation equipment.

Giving and Using Feedback

Feedback is information we receive on our performance. We have already talked about the idea that you receive feedback internally from sensors in your body that give you information on what your body is doing. You can also receive feedback externally in several ways. The most obvious is what happens when we drive a golf ball, for example—we know whether we have been successful or not because we know where the ball has gone. We know when we fall down doing a skill that something wasn't quite right. It is important when we are not successful at something—and even when we *are* successful—to ask ourselves why it turned out that way. What did we do to make it happen? If we are to improve what we do, we need to have information on the process we used to make something happen.

We can also receive feedback from others. The kind of feedback most helpful to us is feedback that gives us information on what we have done in the process of moving that will help us improve the process. If you can videotape what you do, you can do a self-analysis and determine what you did and what you need to do to get better. Often we have to rely on others to look at what we are doing and help us get better. To give good feedback to others, we need to know how a skill should be done well, be able to compare the performance we see with what we know about how the skill should be done, and then make decisions about not only what to communicate but how to communicate to the performer. Following are several important ideas related to how to give feedback to others.

Don't give a person too many things to work on at one time. When people are trying to learn a motor skill, they can absorb only a certain amount of information; therefore, it is difficult for them to work on trying to improve more than one or two aspects of what they are doing at a time.

Be selective in the information. If a person can't work on more than one or two things at a time, it means that we need to choose what is most important for the person to work on. Start with things easy to correct (usually the preparation to get ready to do a skill, or the way in which to move into position to do the skill). Then work on the major parts of the skill, followed by the parts of the skill that are more "refining."

Don't forget to point out what a person is doing right. Sometimes when we're trying to help someone, we forget that it is just as important for us to have information on what we have done right as it is to have information on what we need to improve. When you are giving feedback, remember to reinforce what the person is doing right.

Phrase your comments positively and in terms of what to do. It is important for us to be positive in the way we give information to people who are trying to learn skills. Instead of saying, "you aren't stepping into your swing," we can say, "step into your swing more as you go to contact the ball." Not only is the second idea positive but it gives the learner information on what to do instead of focusing on what he or she hasn't done.

What Abilities are Involved in Developing and Learning Motor Skills?

Both physical fitness components and motor fitness components affect how you learn and perform motor skills. The health-related physical fitness components are discussed in other places in this text. Cardiovascular endurance, muscular strength and muscular endurance, flexibility, and your percentage of body fat will affect how you perform. The differences between people in these factors increase with age. If you don't have the flexibility to do gymnastics moves, you will

not be able to do it. If you can't run for any length of time, your ability to play games like soccer will be affected. If you don't have the strength to hold a tennis racket with the proper grip, you will not be able to play the game as well.

Other abilities that are more related to motor fitness also affect your performance. We are prone to put many of these abilities together and say that someone is coordinated or not coordinated, but, in reality, looking coordinated is actually the result of many different abilities, and the idea of coordination does not generalize from one skill to another. Some of the motor abilities necessary for skillful performance include speed, agility, reaction time, balance, visual acuity, and eye hand/eye-foot coordination.

Speed. People who can run faster are at a distinct advantage in many sport activities. People who can move some limbs faster than other people are also at an advantage in some activities. Conditioning and practice can somewhat affect a person's speed, but, largely, speed is inherited from your parents.

Balance. When most of us hear the word *balance*, we think about gymnasts or the balance beam. However, there are two kinds of balance, both of which are important in performing both everyday as well as sport activities. Static balance is the stationary kind, the ability to hold your position and to be still for a particular amount of time. Static balance is important for people who want to reach high levels of performance in activities such as diving, gymnastics and dance. Dynamic balance is the ability to maintain your balance while you are moving. Dynamic balance is a critical ability in many sport activities, particularly those that require you to move and change directions quickly. Your ability to balance is very specific to a situation, which means you may be able to balance well in one situation but not in another. For older adults, loss of balance is a primary cause of injury. If we do not maintain our physical abilities, our balance will be affected, and we put ourselves at risk from a safety perspective.

Agility. Agility is the ability to change direction quickly. It is a necessary ability in many sport activities such as tennis, football, badminton, basketball, and soccer. A large part of being able to hit a ball well in tennis is being able to get to the ball and to get yourself into position to hit it. Although we most associate agility with chasing and dodging kinds of activities, agility is also related to our ability to change our body position quickly in activities such as gymnastics and diving. Agility is specific to an activity, which means that you have to work on the kind of agility necessary for the activity you want to do.

Reaction Time. Reaction time is the length of time it takes you to react or respond to something. A goalie responds to a ball that has been directed his or her way. A batter responds to a pitched ball. A sprinter responds to the starter's gun. A basketball player responds to a pass. A person who responds more quickly to these situations has an advantage in performance over those who respond more slowly. The good news about reaction time is that you can increase your reaction time to certain stimuli with practice.

Related to reaction time is anticipation timing. Anticipation timing is your ability to anticipate when something is going to happen, such as when a ball will arrive at a particular point or where a ball has to be hit with a bat. Much of your ability to anticipate what will happen in these situations is related to your ability to "read the cues" that tell you something is going to happen. Professional baseball players do not track the ball after it is pitched—it is moving too fast for the eyes to do this. Rather, they pick up cues from the pitcher as the ball leaves the pitcher's hand as to what is going to happen with the ball. You can learn to pick up the important information from a situation so that you can better predict what is going to happen. Good, experienced coaches, teachers, and players can help you know what to look for in a situation.

Visual Abilities. Your eyes play a critical role in motor skill performance. If you do not have good vision (visual acuity) you will be at a disadvantage in almost any skill that requires you to manipulate a ball or other object in some way. Visual acuity is your ability to see accurately and is usually tested by an eye doctor. Wearing glasses or contact lenses can improve your visual acuity

Your ability to use your eyes in activities requiring a great deal of accuracy and coordination with your feet or hands, such as shooting a basketball, shooting at a target in archery, or kicking a soccer goal, is usually referred to as eye-hand or eye-foot coordination. These abilities can be significantly improved with practice.

A Lifelong Learner

To get the most out of our lives and to stay healthy, we need to remain participants in physical activity. Having the skills and knowing how to learn new skills will give us the opportunity to participate in a wide variety of physical activities at all stages of our lives. Approaching being a beginner with a plan to get better so that participation is more enjoyable will help us have many more opportunities to live our lives more fully.

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CHAPTER 4

Archery

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Introduction

If you watch an archery tournament today, you are likely to see individuals between the ages of 8 and 80, men and women, individuals with disabilities, and individuals from many walks of life. The challenge of shooting an arrow exactly where it was aimed has been taken up over thousands and thousands of years of human history. At one time, developing the skill of accurate shooting was a necessity. Now, archers take up the challenge for enjoyment. Whether in target shooting or in hunting, many people find they can participate in this sport and that they can do it for a lifetime!

In this chapter, we discuss how to execute the archery shot and to practice for archery, whether it is for target shooting or hunting. First, we cover some of the basic terms you must know in order to use archery equipment and to shoot consistently as well as the fitness requirements of archery. Safety is an integral part of the sport of archery, so we discuss what you need to do to shoot safely. Later, we describe forms of competition and scoring and how you can get involved in competitive and recreational shooting.

Terminology

Every sport and recreational activity has a "vocabulary" of terms with specific meanings for that activity. Most are common words that take on a specific definition for the sport, but others can be unique terms. Some are related to the equipment used, some to the skills of the activity, and some to the common errors performers make.

In archery, many of the terms to be learned are related to the equipment used. The bow and arrow have various parts with names that we will be using as we discuss how to shoot an arrow. Figures 1, 2, and 3 show a bow and arrow with these parts labeled. Study these figures carefully to learn the names of important locations and parts of the bow and arrow.

Other terms are found in the list that follows. Some of these have to do with accessories; others have to do with execution of an archery shot, common procedures, and common flaws in shooting form.

Anchor point. A position against the face or neck to which the draw hand is brought, string in hand, the desire being to keep this point the same from shot to shot.

Arm guard. A piece of plastic or leather worn on the forearm of the bow arm to protect it from the slap of the bowstring as it travels forward upon release.

Barebow. A style of archery shooting in which no form of a bow sight or aiming aid is used.

Bounce-off. An arrow that fails to penetrate and bounces off the target. If the arrow struck the scoring surface of the target, the archer might receive a fixed number of points or be allowed to shoot a replacement arrow, depending on the specific set of rules in effect.

Bow arm. The arm of the hand that holds the bow.

Bow sight. A mechanical device mounted on a bow that allows the archer to consistently aim the arrow and systematically adjust for error.

Bow sling. A strap around the bow handle through which the bow hand or fingers are slipped to prevent the bow from falling if the archer uses a relaxed or loose hold on the bow in order to avoid twisting the bow upon release.

Bow square. A device slipped onto the bowstring to measure the brace (or string) height and to measure the nocking point.

Brace. Alternate term for stringing the bow; therefore, a bow bracer is a bow stringer, and brace height is equivalent to string height.

Figure 1. Bow

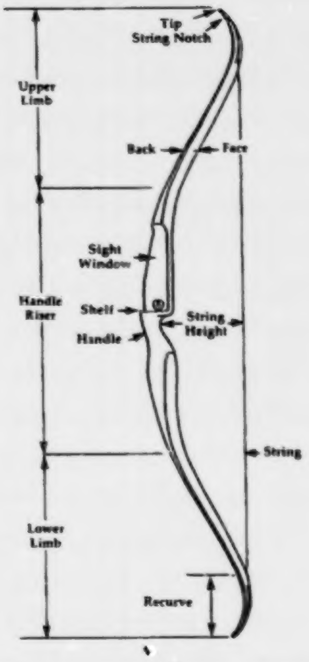
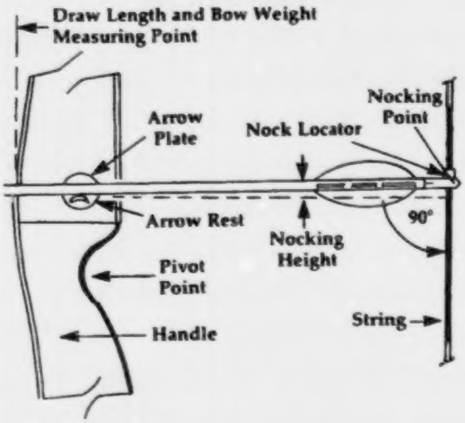

Tip
String Notch
Upper Limb
Back
Face
Sight Window
Handle Riser
Shelf
Handle
String Height
String
Lower Limb
Recurve

Figure 2. Bow and Arrow


Draw Length and Bow Weight Measuring Point
Nocking Point
Arrow Plate
Nock Locator
Arrow Rest
Nocking Height
90°
Pivot Point
Handle
String

Cant. To tip the bow to right or left of vertical when aiming. Especially when shooting with a bow sight, canting detracts from accuracy.

Chest protector. A piece of nylon netting or vinyl worn over the clothing on the bow arm side of the chest to prevent the bowstring from catching on the clothing.

Clicker. A device attached to the bow that sounds (clicks) when the archer has reached a specified draw length; some archers first draw short of this point and then release on the sound as they slowly draw the remaining distance, to prevent creeping.

Compound bow. A bow using a cable system attaching to the bowstring and to eccentric (off-center) pulleys mounted on the limb tips; with this system, the peak draw weight is reached at mid-draw. Consequently, there is less resistance at full draw where the archer spends the longest period of time, anchoring and then aiming the shot.

Creep. To move forward from the anchor point just prior to release. From shot to shot, this flaw produces variation in draw weight, and, hence, arrow thrust.

Draw weight. The pounds of force required to draw a bow a given distance; bows are sold based on the draw weight for a standardized draw length, which might be longer or shorter than an archer's actual draw length.

End. A set number of arrows shot before scoring and retrieving.

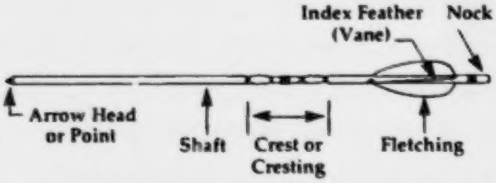
Finger tab. A piece of leather or vinyl worn over the draw fingers to protect them and assure a smooth release of the bowstring.

Flinching. Jerking the bow arm or string hand upon release, usually affecting the flight of the arrow.

Grouping. The pattern of an archer's arrows in the target, used to change the setting of the bow sight or to diagnose a form error.

Hanging arrow. An arrow that penetrates the target face but not the target butt and hangs down across the target.

Figure 3. Arrow


Index Feather (Vane)
Nock
Arrow Head or Point
Shaft
Crest or Cresting
Fletching

Heeling. A shooting flaw in which the archer pushes forward and up with the heel of the hand on release, usually causing the arrow to land higher than its mark.

Index feather. The feather or plastic vane typically of a color different from the others to designate the orientation of the arrow for nocking that results in the best clearance of the arrow's fletching as it moves past the bow.

Kisser button. A small disc mounted on the bowstring at a place that contacts the lips at full draw in order to achieve consistency in anchoring.

Let down. Returning from full draw to the undrawn position, under control, and without releasing the bowstring.

Nock. To place an arrow on the bowstring; also, the plastic piece glued to the rear of the arrow with a notch that is snapped onto the bowstring.

Nocking point. The place on the bowstring where the arrow is nocked, marked by the nock locator.

Overdraw. To draw an arrow past the anchor point such that the tip of the arrow comes off the arrow rest.

Peek. To move the head and bow arm in anticipation of watching the arrow in flight, typically affecting the arrow flight because the arrow has not cleared the bow before the movement.

Pinching. Squeezing the arrow nock with the draw fingers during the draw.

Point-of-aim. A method of aiming by aligning the arrow point with some visual point, typically below and in front of the target.

Pressure point. The spot on the arrow plate against which the arrow lies and presses when the bowstring is released; on expensive bows, archers can select a variety of accessories to place at the pressure point that "give" as the arrow pushes against them.

Quiver. A holder for arrows that may be worn, placed on the ground, or mounted on the bow, the latter typical when hunting.

Serving. A heavy thread wrapped around the bowstring at its center and looped ends to protect it.

Spine. The stiffness of an arrow; archers try to use arrows matched in spine.

Stabilizer. A rod mounted on a bow, often with a weight on the end, that minimizes torque, the rotation of a bow about its long axis, upon release.

Stance. The foot position taken when addressing the target; stances can be open, square, or closed.

String height. The distance between the pivot point of the bow and the string when the bow is strung; must be the proper distance for the design of a bow, although slight adjustments can be made to fine-tune by twisting or untwisting the bowstring, making it very slightly shorter or longer.

Target panic. An inability to hold the bow sight on the bull's-eye long enough to steady the bow before release.

Torque. Rotation of the bow about its long axis upon release, affecting the arrow as it clears the bow.

Fitness Requirements

It is obvious that archery is an upper body activity. Those with greater arm and shoulder strength have an advantage in archery. The more draw weight an archer can use, the more thrust is imparted to an arrow, and the flatter the trajectory of the arrow can be in flight to its target. The flatter the trajectory, the less effect a small error in execution or aiming has on the arrow. So, even though bows are made in a range of draw weights to accommodate archers of all sizes and strengths, archers can gain an advantage by increasing arm and shoulder strength.

In addition to strength, archers benefit from full range of motion, or flexibility, in the arm and shoulder joints and good postural alignment. As we will see later, the key to accuracy in archery is alignment while drawing and aiming the bow. If archers cannot achieve ideal alignment because of limited flexibility, accuracy in shooting is more difficult to achieve, especially when an archer tires.

Those who practice and shoot extensively are performing a repetitive motion at certain joints. Over time, the muscles used can become tight and lose some of their flexibility. Archers do well to make stretching in the arms, shoulders, neck, and upper body a regular part of their fitness routine.

Ideally, then, archers benefit from a systematic strength-training program emphasizing the upper body, arms, and shoulders. Particularly, archers should strengthen the muscles that extend the arms at the shoulders when they are held and move horizontally. Strength training that improves the postural muscles is beneficial, too. Not to be forgotten is a systematic stretching program for the upper body, a program involving all of the joints and all directions of motion.

Archers who hunt also need endurance. Hunting typically involves walking to a hunting location while carrying equipment and climbing up to stands to take a position suited to hunting game. In addition to improving strength and maintaining flexibility, then,

bowhunters should undertake cardiovascular endurance training to meet the demands of their activity.

Skills

Unlike most sport activities, archery really has just one skill: drawing and aiming the bow and then releasing the bowstring. Because the goal is accuracy, though, each step in this skill must be executed precisely and identically from shot to shot. Archers often break the shot into steps. It is sometimes possible to practice the steps in isolation or in short sequences. It is also possible to analyze each step in order to improve the overall accuracy of the shot. Next, we will divide the archery shot into eight steps.

Before we discuss each of the eight steps in detail, knowing one overall idea will help the accuracy of your shooting. In archery, the ideal shot takes advantage of "T" alignment. You can see why this is called "T" alignment by looking at Figure 4. The arms and body form a "T" at full draw. A position that is truly a "T" can be more exactly replicated, or repeated, from shot to shot, and can be more easily held by the body's muscles as an archer is aiming, than any other position.

A shooting form in which the post of the "T" is slanted because the archer is leaning back or in which there is a bump in the crosspiece of the "T" because the front shoulder is hunched is difficult to replicate exactly! Also, the muscles tire more quickly trying to maintain a position in which muscles on one side of the body are working harder than those on the other side. As we move through each of the eight steps in executing the archery shot, our theme will be using techniques that can be easily replicated from shot to shot, especially the use of "T" alignment of the arms and body.

Before you actually attempt to move through the steps below to execute a shot, be sure to read the section on "How to Practice" that follows.

Step One: Assuming a Stance

You need to be balanced and stable throughout the archery shot. After all, you will be drawing the bowstring against many pounds of resistance, yet you will need to be steady to aim the arrow. The typical stance to assume for shooting is with the feet shoulder-width apart and your side to the target. The arm on the side toward the target will hold the bow (***bow arm***) while the opposite hand and arm pull the bowstring back (***string or draw hand***).

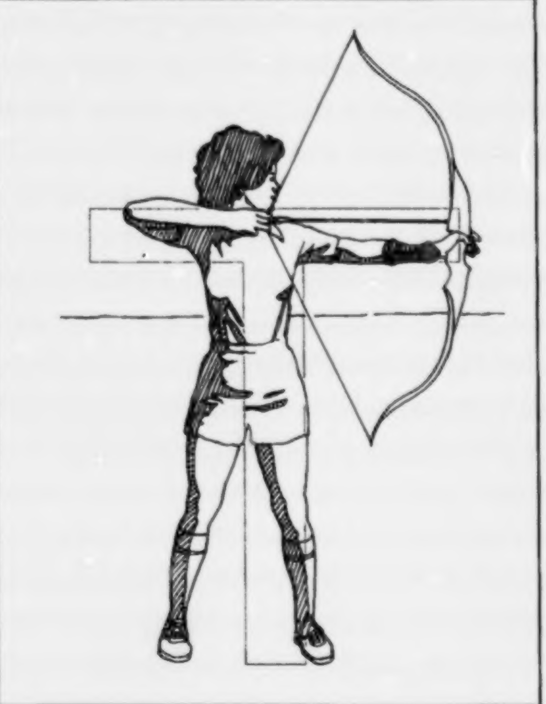
Should you shoot with your right or left side to the target? Most of us prefer that our draw hand and arm be our dominant arm, in which case we would use the following stance:

- Our nondominant arm holds the bow and
- The side of our nondominant arm is toward the target.

We feel stronger in this position. Remember, though, that our dominant eye, dominant arm, and dominant foot are not always on the same side of our bodies! Sometimes a person's dominant eye is on the opposite side of his or her dominant arm. This can cause difficulties in aiming because it is preferable to aim with the eye on the side of the draw hand and arm. A person with an opposite dominant eye can tend to aim with that eye or switch back-and-forth between lining up one eye with the arrow and target on one shot and the other eye on the next shot.

You can determine which of your eyes is dominant very simply. Take an index card or sheet of paper and punch a small hole in it. Hold it in your two hands with your arms extended away from your body. Find a small object or point to watch through the hole. Keeping your focus on that point, gradually bend your arms to bring

Figure 4. The "T" Alignment

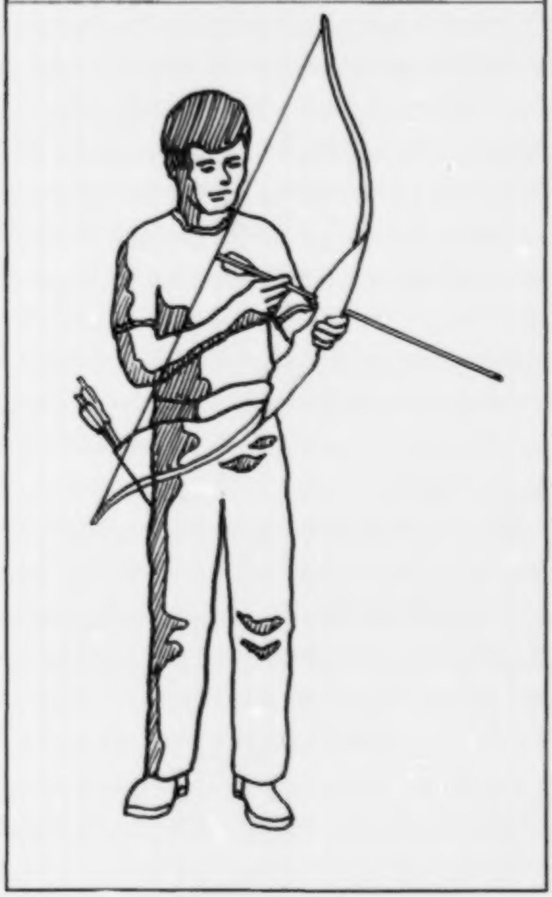


the card or paper back to your face. The hole will be in front of your dominant eye! The hole was too small for both eyes to view to the object, so you naturally and subconsciously chose your dominant eye to focus on it. That is what will happen when you aim in archery.

If it turns out that your dominant eye is on the side opposite the one you would rather use to draw the bowstring, you can practice closing that eye during aiming. This will force you to aim with the eye on the side of your draw hand, the eye that is generally aligned with the arrow.

Archers can vary their foot position in the stance. Some shoot with a square stance, meaning that the toes of their feet are even and an imaginary line through their toes would intersect the target. Others move their target-side foot back and turn it out slightly, an open stance, whereas still others move their target-side foot up, a closed stance. Often it is personal body shape and size that dictates what is best. For now, it is best to use a square stance. It is the easiest to replicate from shot-to-shot. Later, with more shooting experience, you can vary your stance to determine the one best for you. Stand erect with your shoulders back and level to establish the upright part of your "T" form.

Figure 5. Nocking the Arrow



If you are shooting on an archery range, a shooting line might be marked on the floor or ground. The practice is for archers to straddle the shooting line with their two feet. This is a matter of safety, keeping archers in line so that no one is ahead of the others, and should be strictly followed. You should wear an arm guard on your bow arm and a finger tab on your draw hand.

Step Two: Nocking the Arrow

Once you have assumed your stance, you can "nock your arrow," or place it on the bowstring. From this point on, you should make sure your bow is pointed toward the target, not at any other archers shooting in front of you, nor up in the air. Especially take care if you turn around to speak to someone behind you that you do not swing the bow around, too! During the nocking step, it is best to hold your bow vertically and directly in front of you, pointing toward the target (see Figure 5).

Take an arrow with your draw hand and place its shaft on the arrow shelf or arrow rest, if your bow has one. Turn the shaft so that the slit in the plastic nock on the back of the arrow is vertical, like the bowstring. Now look at the fletching. The odd-colored feather or vane should be *pointed toward you*. If it is not, turn the arrow so that it is. In this position, the other two feathers will have minimal contact with the bow when you send the arrow forward. If the odd-colored feather is away from you, it will contact the bow head-on and cause the arrow to wobble in flight.

You should nock your arrow immediately below the nock locator—a metal, plastic, or string attachment to the bowstring. This assures that your arrow will have the same orientation on each and every shot. If you nock the arrow sometimes slightly higher or sometimes lower on the string, the arrow will leave the bow at various angles, even if you aim your arrows to the same place, resulting in high and low shots.

Step Three: Setting the Hands

Your first instinct might be to grip the bow tightly with your bow hand, so that the bow does not fall when you release the arrow. Archers who hold their bows tightly, though, tend to twist them slightly during the release, affecting the arrow as it travels past the bow. So, the

ideal grip in archery is a relaxed one. Slings are available that wrap around the bow and bow hand or fingers to prevent the bow from falling. Be sure to center your hand on the bow's grip so that it is not too close to the arrow when it leaves the bow.

Form a hook with the middle three fingers on your draw hand. Let these fingers then hook onto the bowstring, your index finger above the arrow and the other two fingers below it. The bowstring should be in the finger joint nearest your fingertips. By holding the string in this joint, you will have the least amount of contact between your fingers and bowstring as you relax, your fingers extend, and the bowstring moves forward.

New archers sometimes curl their draw *hand*, rather than keeping the backs of their hands flat and simply curling their fingers. This causes the bowstring to twist, and because the arrow is snapped onto the bowstring, the shaft of the arrow pivots off the arrow shelf. If this happens to you, stop, replace the arrow, and try to keep the back of your hand flat as you hook onto the string. New archers also tend to hold the nock of the arrow with their fingers, thinking this will keep the arrow from pivoting off the arrow rest. In fact, this can cause the arrow to do that very thing. The arrow nock should snap onto the string, so all you have to do is hook onto the string, not worrying about the arrow.

Step Four: Positioning the Bow

The next phase of the archery shot is to extend the arms toward the target (see Figure 6). Turn your head to look over your front shoulder. Rotate the elbow of your bow arm down and out, rather than hyperextending your elbow. Keep your arms and shoulders level to keep the cross piece of your "T."

Archers sometimes vary in the angle between their forearm and their hand, that is, in their wrist angle. Some hold the forearm so that it is level with the top of the bow hand (the index finger and thumb), some so that it is lower, and a few so that it is higher. As you are beginning to learn the archery shot, it is best to have the forearm level with or slightly below the top of the hand, as shown in Figure 6.

Step Five: Drawing the Bow

Keeping your front shoulder down, to maintain "T" alignment, move the elbow of your draw hand straight back at shoulder level (see Figure 7). Your focus should be on *moving your elbow back*, not bending your arm at the elbow. That will come naturally, as you use your back muscles, squeezing your shoulder blades together, to draw.

Step Six: Anchoring the Draw Hand

An important step in the archery shot is the anchor, the position contacting the face or neck to which you want to draw the bowstring on each and every shot. The more precisely you can anchor, the more accurately you can shoot. There are several styles of anchors in archery. There is one with the draw hand under the chin, sometimes called a ***low anchor*** (see Figure 7), one with the draw hand next to the face, sometimes called a ***high anchor***, and several in between. It is better if beginners use the low anchor, because the low anchor tends to prevent archers from overdrawing (see Figure 8). Overdrawing can be dangerous because the arrow slides off the back of the arrow shelf or rest and can lodge in the bow, shattering on release, or in the hand.

In the low anchor, you slide your draw hand under your chin as you are moving your elbow back. The top of your draw hand, the thumb, and index finger actually touch the chin under the jawbone. Stop when the string touches the center of the chin. The string should also touch the tip of the nose; if it isn't touching, you might have your head tilted slightly back and need to tilt it forward until the nose touches the bowstring. Some archers even use an accessory called a kisser button, a disc placed on the bowstring to touch between the lips. This gives the archer multiple contact points between the draw hand/bowstring and face, increasing the precision of the anchor and the accuracy of shooting.

With more shooting experience, you can try other anchors. Individuals with short necks especially might find a higher anchor more comfortable. By the time you

Figure 6. Positioning the Bow

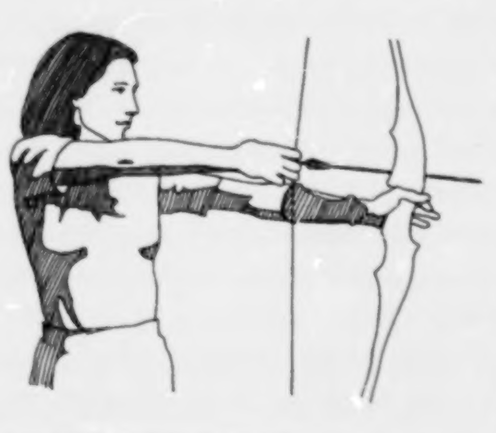
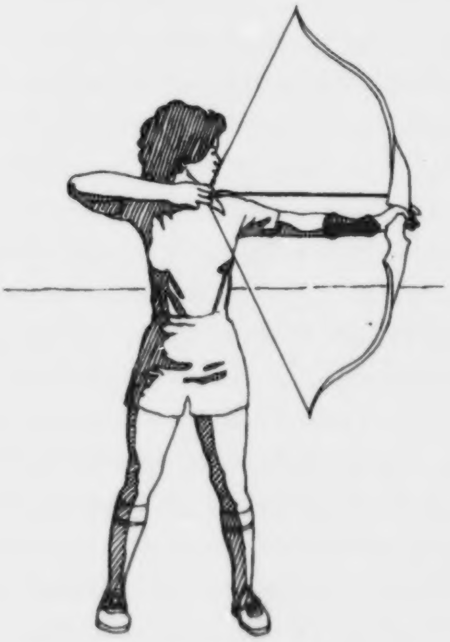


Figure 7. Drawing the Bow



have more experience, though, you will be used to anchoring, and it is less likely you will overdraw.

Step Seven: Aiming the Bow

If you are first learning to shoot without a bow sight, you will use the eye on the side of your draw hand to line up the tip of the arrow with the bull's eye of your target. This will direct your arrow toward the target in the left/right or horizontal direction.

Where to place the tip of the arrow in the vertical direction is a matter of trial and error. It depends on your distance from the target and the draw weight of your bow. Arrows, especially when shot from bows that have a light draw weight, travel in an arc. You need to direct the arrow slightly upward so it will come down to your target. The farther you are from the target, the higher you must direct the arrow. So, at a short distance, the tip of the arrow might be aligned with a point on the ground below the target, whereas it is aligned with a point on or above the target at a longer distance.

If you are first learning to shoot with a bow sight, the sight will have an aperture that is superimposed over the bull's eye. Some sight apertures are a post with a rounded tip, some a circle, some a dot on a disc of glass. Whatever the style, the principle is the same: superimpose the sight over the bull's eye on every shot. If the arrow does not land near the bull's eye, move the sight rather than trying to aim at a different place on the target.

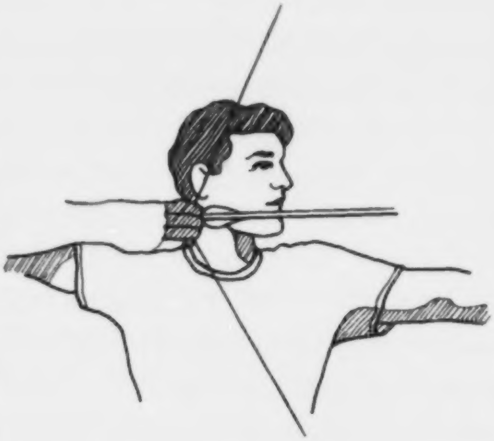
Although this might seem odd at first, you should move your sight *in the direction* your arrows are landing away from the bull's eye as you point your bow toward the target. That is, if your arrows are landing higher than the bull's eye, move your sight *up*. Moving the sight up actually lowers the bow, causing your arrows to travel in a lower arc. If your arrows are landing right of the bull's eye, move your sight to the *right*, when it is positioned as it is when you shoot.

Whether you are aligning the tip of the arrow or a bow sight in order to direct your arrow to the target, you usually will have to move your bow arm slightly to aim the arrow where you want. Let your arm settle, gradually moving less and less. When you have settled, you are ready to release the bowstring. It is not necessarily the case that your bow arm must be perfectly still before you release. Forcing your arm to be perfectly still generally will cause you to grip the bow too tightly, and you will probably move more.

Step Eight: Releasing the String

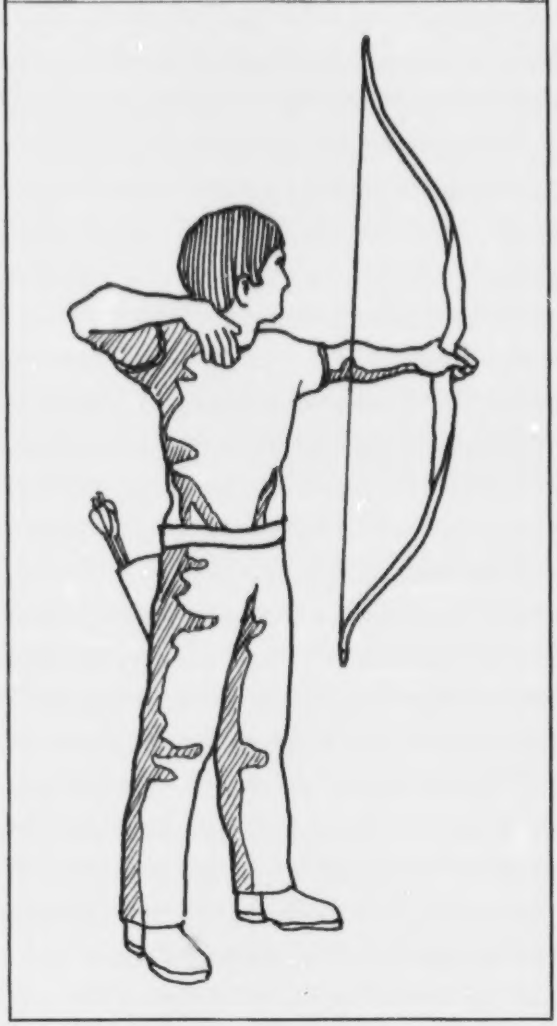
Of all the "actions" in sports, releasing the bowstring is the one that involves the least action. In fact, the release in an archery shot is actually a relaxation of the draw fingers, a decision not to hold the bowstring any

Figure 8. Overdrawing



more. The least movement you can have with every other part of your body, the better. If you used your back muscles to draw, your draw arm might move slightly backward as your fingers straighten and the string moves forward. Ideally, though, you want your body to remain erect, your head to remain still, and your bow arm to remain extended toward the target (see Figure 9). Any movement can potentially affect the arrow before it completely clears the bow and change its flight to the target. Many archers like to maintain their stillness and the "T" position until they hear the arrow hit the target. This keeps them from anticipating the time when the arrow clears the bow, lest they begin to move too soon and change the arrow's flight. So the follow-through in archery is actually maintaining position, not moving.

Figure 9. The Release



Practice for Improvement

We have reviewed what goes into executing a successful archery shot. Although it is a single skill, it has many steps, and archers must manipulate equipment to shoot. Most individuals find it awkward at first. So, how should you begin to practice the archery shot? There are two basic approaches. One is to break the shot down into its steps and practice one or a few steps at a time. The other is to practice by mimicking the shot, that is, going through the motions without actually shooting an arrow.

You can mimic first without any equipment at all and then with equipment. When using equipment, you can mimic the shot with a bow but no arrow, then with an arrow. Remember two precautions. Never release a bowstring without an arrow. This is called "dry firing" and could potentially damage the bow. Also, any time you practice with an arrow, whether you intend to release it or not, practice on a range with your bow pointed toward a target.

Here are some ways to practice by using or combining the two approaches:

- Mimic without a bow, then with a bow, then with an arrow, before shooting
- Practice assuming the stance, setting the hands, positioning the bow
- Add nocking an arrow to the sequence
- Practice positioning the bow, drawing, and anchoring, without a bow
- Add a bow to the sequence; ease the bowstring back to the relaxed position after holding your anchor position for several seconds
- Add an arrow to the sequence above, again easing the bow down after several seconds
- Practice the whole shot, first without equipment, then with a bow (remember to ease the bow down)
- Practice the whole shot with bow and arrow up to the point of release
- When you are comfortable manipulating the equipment and anchoring, add the release

Especially in mimicking without equipment, you do not need to always practice the steps of the archery

shot in order. For example, you can mimic drawing to your anchor position, settling, then relaxing to release the bowstring and follow-through. When using an arrow to practice, start the shot over any time the shot does not feel comfortable or the arrow falls from the rest.

Once you start shooting, it is generally better to practice at short distances at first and to gradually increase your distance as you improve. Remember, a small misalignment has a greater and greater effect as the arrow moves away from you. The same error that results in an arrow landing on the target butt at a short distance can result in a complete miss at a long distance.

Archers often analyze their arrow groupings to guide their practice. If some shots land near the bull's eye and some shots high on the target, it is likely that a form error is contributing to those "high misses." An aiming or bow sight adjustment would not correct the problem because those well-shot arrows now landing near the bull's eye would land below the bull's eye after such an adjustment. Likewise with misses in other directions. So archers must determine what flaw in shooting form is likely to cause these misses. Archers consult an error analysis chart like that in Figure 10 for the possible errors contributing to that particular error.

Error analysis charts typically provide a list of possible flaws. You might find it difficult, as a beginning archer, to determine which of the possibilities is influencing your shots. Your instructor or another archer can watch for these shooting flaws, or you can videotape yourself shooting so that you can identify shooting flaws on your own.

It often helps to have a mental checklist of reminders or cues in mind as you execute the eight steps of the archery shot. A short list for beginners is in Figure 11. With practice and experience, you can drop out some cues, perhaps adding others that help you avoid form flaws. You can practice saying your list, or you can write it out and review it before executing a shot.

Safety Concerns

Shot arrows have amazing penetrability. Arrows have even been shown to penetrate objects that stop small-caliber bullets. So it is absolutely necessary for every shooter to have safety in mind at all times. One moment of inattention can have lethal results. Safety must be a habit, but never an unconscious habit, and safe shooters must insist that other archers follow safety rules, too. You do not want your enjoyment of archery to be spoiled by those who are careless.

Shooting safely requires action before shooting, during shooting, and after shooting, when retrieving shot arrows. Let's look at the steps you should take at each of these times to shoot safely.

Before Shooting

1. Select a bow with a draw weight you can handle, that is, a bow that you can hold at full draw until you have settled and aimed the arrow at your target.
2. Select arrows that are long enough for your arm length. Seek the help of a teacher or experienced shooter if you are unsure of the proper arrow length.
3. Inspect all of your equipment, especially the bow, bowstring, and arrows, to make sure they are in good repair. Do not use any piece of equipment that is damaged.
4. Dress appropriately by wearing shoes, removing jewelry, removing pens from chest pockets, tying back long hair, and avoiding baggy shirts or shirts with extra trim (like flaps and buttons on shirt pockets).
5. Wear an arm guard and use a finger tab.

During Shooting

1. Shoot from the same shooting line as the other archers on the range and always straddle the shooting line.
2. Wait for the signal to shoot before nocking an arrow. If you are shooting on a range not monitored by a teacher or range captain, wait until everyone is behind the shooting line.
3. Check the area behind and to the side of your target to make sure it is clear.
4. Once you nock an arrow, make sure your bow is pointed at the ground or toward the target at all times.
5. Keep the index finger of your bow hand away from the arrow. If the arrow falls off the rest during the draw or hold, ease the bow down and start the shot over.
6. If an arrow or any part of your equipment falls in front of the shooting line, leave it there until it is time to retrieve arrows unless you can rake it back to you with your bow.
7. Stop shooting immediately if you hear an

emergency signal or warning from another archer.

After Shooting

1. When you have finished shooting your arrows, step back from the shooting line so that the teacher or range captain can see when everyone is finished.
2. Cross the shooting line only when signaled. If you are shooting on a range without a teacher or range captain, make sure everyone has finished and has put their bows down before crossing the line.
3. Watch for arrows landing short of the target as you walk toward the target. If they are embedded in the grass, pull them forward and out of the grass.
4. Walk rather than run to the target. Serious eye injuries can occur if you trip and fall into the arrows in the target.

Figure 10: Error Analysis Chart (Written for Right-Handed Shooter)

Arrows Go High

1. Leaning back
2. Overdrawing
3. Heeling the bow
4. Anchoring with mouth open
5. Throwing bow arm up at release
6. Peeking to watch arrow in flight
7. Misaligning draw elbow (holding it higher or lower than T position)

Arrows Go Left

1. Catching bowstring on clothes
2. Nocking arrow backwards
3. Canting bow to left
4. Bending bow arm wrist on release
5. Throwing bow arm left on release
6. Leaning back
7. Pulling arrow off rest at release
8. Squeezing arrow nock
9. Releasing while draw hand is away from face or neck
10. Aligning stance to left of bull's eye
11. Sighting with wrong eye

Good Form Sends Arrows Here

Arrows Go Right

1. Plucking bowstring at release
2. Peeking to watch arrow in flight
3. Canting bow to right
4. Bending bow arm wrist on release
5. Throwing bow arm right on release
6. Leaning forward
7. Drawing by bending elbow rather than using back muscles
8. Holding bowstring too deep in draw hand hook
9. Aligning stance to right of bull's eye

Arrows Go Low

1. Creeping forward on release
2. Dropping bow arm
3. Bending bow arm
4. Bending wrist down on release
5. Moving head forward
6. Stopping draw short of anchor point

Figure 11: A Mental Checklist for Executing the Shot

- Assume stance
  - Stand erect
  - Toes even
  - Bow in front
- Nock arrow
- Set hands
  - Relaxed grip on bow
  - Hand behind handle
  - Draw hand hook
- Position bow
  - T position
- Draw
  - Elbow back
- Anchor
- Settle and aim
- Relax hook to release
  - Maintain T position

5. Be sure there is no one behind you when you pull arrows from the target. Place one hand against the target face and grasp the arrow close to the target with the other. Twist the arrow out of the target.
6. Carry your arrows back to the shooting line in a quiver, or if in your hand, with the tips in the palm of your hand.
7. If you have to retrieve arrows from behind the target, be sure one archer stays in front of the target or that you leave a bow or quiver in front of the target so that other archers know that not everyone has returned to the shooting line. This is especially important when a teacher or target captain is not monitoring the range.

Competition

The most common competition in target archery is a tournament. A tournament can consist of one or more "rounds," specified numbers of arrows shot from specified distances at targets of a specified size. For example, the FITA Round for Men consists of six ends of six arrows each, shot at each distance: 90m, 70m, 50m, and 30m. A 122 cm, 5-color, 10-scoring-ring target is used at 90 and 70m and an 80 cm one at 50m and 30m. Typically, the archer with the highest score is the winner.

The Shooting Area

The archery range on which a tournament is to be shot should be marked for the shooting distances of the round or rounds to be shot. Clearly marked shooting lines should be provided at each shooting distance.

The number of target butts available for a tournament influences the number of entries possible. If large target butts are available, four archers at a time can shoot at a target butt. At longer distances, most rounds use large targets, and all archers assigned to the target butt shoot at the same target face. At shorter distances, multiple small targets are placed on the target butt, and each archer shoots at his or her own target. The more accurate the archers, the fewer should be assigned to one target face, because most arrows are landing in a small area. Incoming arrows can damage those already landed.

Field archery tournaments are shot on courses laid out like those in golf but usually set in wooded areas. The shooting distances at each of 14 targets vary. Some rounds use targets that are pictures of game animals. There are also tournaments that help bowhunters practice for hunting. These tournaments use three-dimensional, foam targets shaped like game animals. Archers must shoot from marked stakes an unknown distance from the target.

Players

Earlier we acknowledged that people of many ages and abilities can enjoy archery, so just about anyone can compete in a tournament. Tournament organizers, though, can organize archers into different categories so that archers compete with others having a similar characteristic, such as gender or age, or using similar equipment, such as a bow sight, a compound bow, etc. Amateurs and professionals shoot in different classes as well.

Rules

Tournament shooting is a great way to enjoy archery while testing your skills and monitoring your improvement. In archery, the competition is more with oneself than "against" the other shooters, even though one archer is recognized for shooting the best score. One should be courteous toward the other shooters and avoid actions or noises that can distract another shooter.

A tournament official is designated to run the shooting line, that is, to signal for archers to come to the shooting line, to begin shooting, and eventually to score and retrieve arrows. In some tournaments, one

line of shooters shoots all their arrows, then steps back behind a waiting line while a second group of archers shoot, before everyone goes forward to score and retrieve.

If you have equipment difficulty during a tournament, raise your bow. The tournament official will come over and check your equipment. If you can repair the problem, the official likely will give you an opportunity to make up the arrows you missed.

Scoring

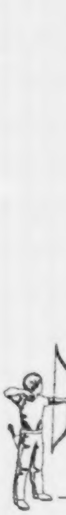
Usually the archers assigned to a target assume various roles in scoring. One archer calls out the value of an archer's shots while one or two others record the values, one archer at a time. The points for each individual archer are recorded as well as the total for the end and the running total for the round. The remaining archers can look for any arrows that overshot the target.

The traditional archery target has five concentric, colored rings: yellow/gold, red, blue, black, and white, from the center outward. As archers and archery equipment have improved, it has become common to divide each ring into two scoring zones, resulting in 10 scoring rings, scored 10 to 1, center outward. The lines dividing the scoring rings are considered to be in the higher valued area, and any arrow even touching a line is awarded the higher value. Other archery targets have been designed. These can vary in color and the number of scoring zones and are a nice "change of pace" from the traditional target.

If an arrow passes through the target and target butt or bounces off the target, it is sometimes awarded 7 points, depending on the particular rules in use for a tournament. Other rules might require the archer to shoot the arrow again. Tournaments specify the number of arrows an archer is to shoot in an end. If an archer shoots too few arrows, the value of those arrows not shot is lost. If an archer shoots too many arrows, only the lowest scoring arrows, of the number in the end, are scored.

You probably will not have to worry about this for awhile, but if an archer shoots an arrow that embeds itself in or splits an arrow already in the target, that arrow receives the same value as the one it split. This does not occur very often, and usually only when an archer shoots so well as to shoot almost all his or her arrows in a tight group within the bull's eye.

Tactics



Unlike many sports, the best strategy for shooting well (in addition to practice, practice, and more practice) is to select equipment that is well-suited to your personal size and strength. We will cover just a few aspects of selecting equipment here. Seek out the help of a teacher, experienced shooter, or pro shop employee if you are new to archery and want to purchase your own equipment.

Many archers say that if they had a choice of expensive arrows and a cheap bow or an expensive bow and cheap arrows, they would choose expensive arrows. To achieve consistency in archery, the key to success, archers must have consistency in arrow flight. Therefore, the ideal in archery is to have a set of arrows that are identical in stiffness of the arrow shaft, as well as in length, weight, and type of fletching. The stiffness of the shaft also should be appropriate for the draw weight of the bow (to read more about why the stiffness of an arrow is important, see Bolnick et al., 1993 or Haywood & Lewis, 1997). There are relatively low-cost aluminum arrows available that can be well-matched to your bow.

There are many types of bows available today, ranging widely in cost. A major distinction is between recurve bows and compound bows. Recurve bows consist of the bow (which can be a bow handle with detachable limbs) and a bowstring. Compound bows consist of the bow and a bowstring, but also metal cables and one or more pulleys. Compared to recurve bows, compound bows have the advantage of a draw weight that reaches its peak at mid-draw rather than at full draw. The lesser resistance at full draw allows a shooter to use a bow heavier in overall draw weight, a special advantage for hunting.

There is no disadvantage to learning to shoot with a recurve bow, even if you eventually plan to shoot a compound bow. It is more important to develop good shooting form early in your archery experience; often, bows light in draw weight make that easier. The designated draw weight of a bow is the draw weight at a certain length of draw, often 28 inches. If your actual draw length is longer, your draw weight with that bow will be greater, and vice versa. So it is not automatically the case that a larger individual should begin with a bow heavier in draw weight than a smaller individual.

Resources for Continued Participation

One good way to find opportunities to participate in archery is to check at a local pro shop. The shop is likely to have a list of local clubs. A pro shop might be located at a commercial archery range or know where such ranges are located. These ranges likely sponsor opportunities for participation. One of the most enjoyable is archery leagues. These are conducted much like bowling leagues, with archers establishing a handicap so that everyone, regardless of gender, age, equipment, or ability, can shoot together.

Another way to locate archery organizations is by searching on the Internet. National organizations likely can provide you the name and location of local clubs affiliated with that organization.

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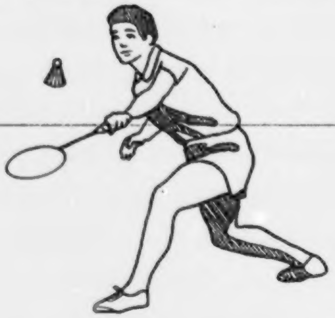
CHAPTER 5

Badminton



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Badminton is a sport that offers fun, fitness, and competition for everyone. It is easy to learn but difficult to master. A beginning player receives pleasure and exercise and can learn to play a game after a brief practice period. Although badminton can be enjoyed outdoors, competitive play and most recreational play take place indoors because wind and other environmental factors will adversely affect the flight of the shuttle. Badminton can be played for fun and relaxation or as a highly competitive Olympic sport requiring high levels of skill and fitness.

Although the shuttlecock (shuttle or bird) can be hit about 200 mph off the racket, it slows down rapidly, giving the player an opportunity to retrieve it. In competitive play, most rallies are between 5-15 hits for both singles and doubles events. Because of the light racket and variable shuttle flight characteristics, badminton is a sport requiring great finesse, strategy, agility, quickness, power, and physical fitness. Most players find that court knowledge, shuttle anticipation, and deceptive placement of the shuttle are as important in winning matches as are powerful shots and physical prowess.

Although American badminton dates back to the 1870s, historical evidence indicates similar games using an implement and feathered projectile were played in ancient Greece, in the fifth century in Asia, and from the seventeenth century in Europe. During 1850–1870, badminton evolved in India and England. In India the sport was called *poona*. The sport was named badminton when British Army officers, home on leave from India, played it at Badminton House, the Duke of Beaufort's country estate in Gloucestershire (Avon), England.

In 1901, the "Laws of Badminton" were ratified and thus established the standard court size, shuttlecock construction, and rules of play. The game has changed very little over the last 100 years. The American Badminton Association was founded in 1936 and was renamed the U.S. Badminton Association in 1977 and USA Badminton in 1990. It is the national governing body of international badminton in the U.S. National age-group championships are held annually for Juniors: under 21, 18, 16, 14, and 12 years; and Seniors: ages 35 to 80+ at 5-year intervals. Collegiate badminton began in 1969 for women and in 1975 for men. Although badminton is not an NCAA sport, it has received status as an emerging NCAA sport. World team championships were initiated in 1948 for men (Thomas Cup), in 1956 for women (Uber Cup), and in 1989 for the mixed team championship (Sudirman Cup).

After appearing as a trial sport in Munich in 1972 and as a demonstration sport in Seoul in 1988, badminton became an official Olympic sport with the 1992 Summer Olympic Games in Barcelona, Spain.

Badminton is especially well suited for physical education classes because it can be adapted to a wide range of skill levels and offers opportunities for both genders and mixed gender play within the same class structure.

Terminology

Alley. The 1 1/2 foot area of the court between the singles and doubles sidelines.

Around-the-Head. A stroke hit from the backhand side of the body with a forehand stroking pattern.

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Attacking Clear (Offensive Clear). Low, flat clear used to run your opponent to the backcourt.

Backcourt. Area between the center of the court and the back boundary line.

Backhand. Strokes hit on the opposite side of the body from the racket hand (left side of the body for right-handed players).

Baseline. Back boundary line of the court, long service line for singles.

Base Position. Ready position to which players try to return after each shot.

Bird (Shuttlecock, Shuttle). Slang term for a shuttlecock or shuttle. The object hit back and forth over the net.

Block Shot. A soft return of a smash requiring very little racket motion.

Clear (Lob). A shot hit high and deep to the opponent's backcourt.

Cross-Court. A shot hit diagonally from one side of the court to the other. All serves are hit cross-court.

Deception. Body or racket movement used to lead the receiver to believe the shuttle will be hit at a different speed or direction than it actually takes.

Defense. Situation in which your opponent has the opportunity to hit a smash at you.

Double Hit. One player hitting the shuttle twice in succession or both players in doubles hitting the shuttle during the same shot. It is a fault.

Drive. A sidearm stroke hit so as to land between the opponent's short service line and the back boundary line.

Drop Shot. A shot hit from any position that passes close to the net and lands in the opponent's forecourt (in front of the short service line).

Even Court. Side of the court corresponding with the right service court.

Fault. Violation of the rules.

Flick Serve. A service hit with a trajectory to just pass over the receiver's outstretched racket and land near the long service line.

Follow-Through. Movement of the racket and body after racket-shuttle contact during the execution of a shot.

Foot Fault. Illegal placement or movement of a player's foot during the service.

Forecourt. Area between the net and the center of the court.

Forehand. Strokes hit on the racket-hand side of the body.

Game. A badminton game is played to 15 points in all events except women's singles, which is played to 11 points, unless the game has been set.

Game Point. A designation to indicate that the rally ends the game if it is won by the server.

Half-Court Shot. Shot hit down the sideline that lands in opponent's court midway between the net and the back boundary line.

Inning. Period during which a player or team holds the service.

Kill (Put-Away, Winner). A fast downward shot hit to win a rally.

Let. An incident that requires the replay of a rally.

Lob (see Clear).

Love. A term used to indicate a score of 0 points.

Match. The best two out of three games.

Match Point. A rally that, if won by the server, ends the match.

Mixed Doubles. A game contested with a male and female on each team.

Net Shot (Drop Shot). A shot played to the opponent's forecourt, dropping close to the net.

Odd Court. Side of the court corresponding with the left service court.

Offense. A player or team on the attack or with the opportunity to smash the shuttle.

Offensive Clear (see Attacking Clear).

Overhead. Strokes hit above head height.

Power Shots. Shots that are hit very hard: clears, drives, and smashes.

Put-Away (see Kill, Winner).

Rally. The exchange of shots during play or during warm-up.

Ready Position (see Base Position).

Receiver. Player who receives the service.

Second Server. A term used in doubles to indicate that the server is the second player to serve in that inning.

Service. Act of putting the shuttle in play to begin a rally.

Server. Player who hits the serve.

Service Over. Term meaning the other side gains the service.

Setting. Method of extending the game when tied near the end of the game.

Side-In. The side whose turn it is to serve.

Side-Out. Term used when the serving side loses the serve and becomes the receiving side.

Short Service Line. The forecourt boundary line over which the service must pass.

Shot. A clear, drive, drop, or smash that has been

hit from one of the stroking positions.

Shuttlecock (Shuttle, Bird). The object hit back and forth over the net.

Smash. A hard overhead shot hit with a downward angle.

Stroke. The basic hitting pattern from which all shots are executed.

Trajectory. The flight pattern of the shuttle.

Underhand. Stroke in which the shuttle is contacted below the waist and in front of the body.

Fitness Requirements

When badminton players are of equal skill, fitness often becomes an important factor in determining the winner. Endurance is important because badminton matches are generally 30 to 90 minutes in duration and about 30-45% of this time is actual competition. Most rallies consist of play patterns characterized by abrupt changes in direction coupled with explosive jumping, lunging, and upper-body throwing motions. Strength is also an important factor in badminton even though the rackets weigh less than 4 ounces. Men and women can smash the shuttle at speeds up to 210 mph and 180 mph, respectively, and many clears, smashes, and drives are struck with near maximum effort on both the forehand and backhand. In addition, leg strength is important for the lunges to the net and jumping backward in the court to hit clears and smashes. Players who are in excellent physical condition develop confidence and feel comfortable in playing long rallies that require a great deal of running, jumping, and lunging.

To increase stamina, strength, and speed, the fitness-training program for badminton players should consist of drills and fitness training designed to increase muscular strength and endurance. The exercise movement patterns used during training should mimic actual play patterns used in competition. Thus, endurance, strength, and quickness will increase for the movement patterns used in the sport.

Three general categories of fitness-training drills should be used to promote badminton fitness, depending on the skill level of the student.

1. **Traditional Fitness Training**: wind sprints, running, rope skipping, circuit weight training and calisthenics – These training techniques are excellent for all skill levels. Strength training for badminton players should emphasize toe raises, leg flexion and extension, trunk flexion, elbow flexion and extension, forearm rotations, and wrist flexion and extension exercises.
2. **Shadow Drills:** These are footwork and running and jumping exercises to mimic play patterns that can be performed either on or off the court (Figure 1). The player can run a set pattern to become efficient in court movement or can be directed by a trainer which court area to move toward and return to a base position. The runs should last 15 seconds in the beginning and increase in duration and number as skill and fitness improve. Students can carry their rackets and simulate hitting a shuttle at each position.
3. **Pressure Training:** These are high-intensity badminton playing drills, which require the player to move to all areas of the court either in set or varying patterns to return the shuttle. These rallies are created by a skilled setter (instructor) or 2-against-1 player drills. For example, Figure 2 shows a movement pattern in which Player A hits all net drops and must alternate runs from the baseline to the net to return each shot. Player B, the setter, alternates

Figure 1. Shadow drills to eight court areas for self-directed or trainer-directed patterns

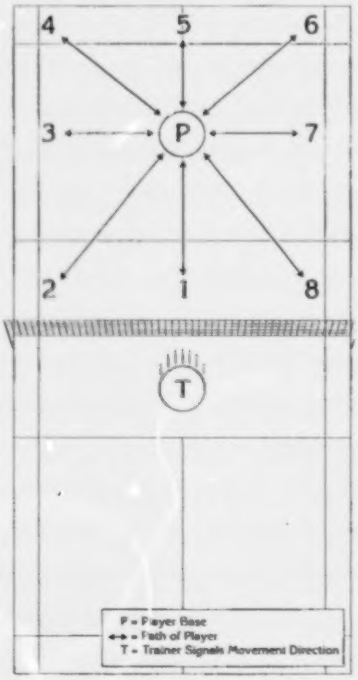


Figure 2. Player A runs back and forth from the net to the backcourt and hits all drop shots. Player B plays in the forecourt and alternates hitting clears and drops

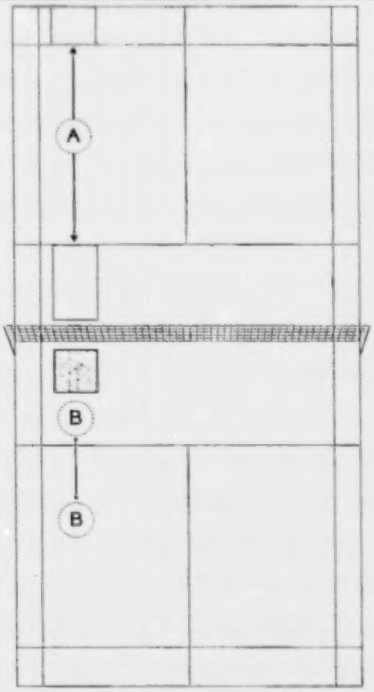
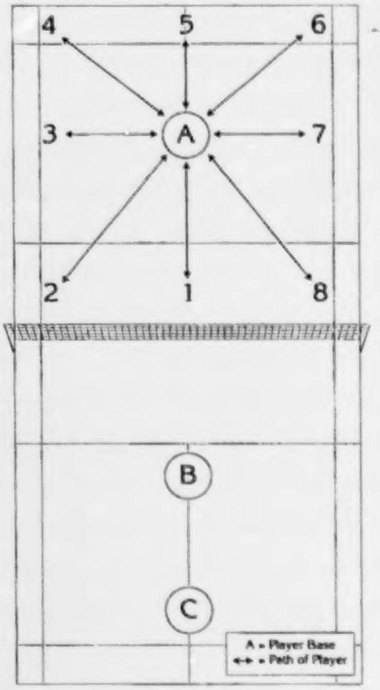


Figure 3. Two-against-one pressure training drill



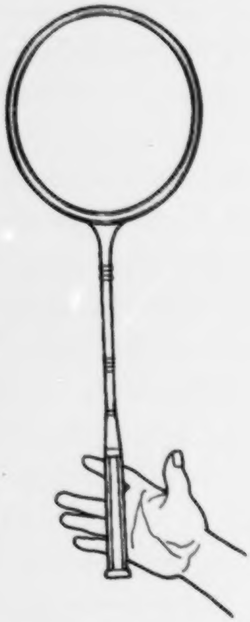
hitting clears and drops so Player A has to work hard to retrieve the shuttle. Two-on-one drills (Figure 3) are excellent fitness conditioners. Players B and C can hit the shuttle to any place on the court with the objective of making Player A move at top speed to return the shuttle. Player A can hit any shot as well. This format is useful for 30 seconds work and 60 seconds rest training. If a shuttle is missed, another one is immediately put in play by Player B. Thus, each rally is essentially a 30-second rally. The players will then rotate positions.

Skills

Grip

Proper racket grip is the first skill a player should develop, as this is essential for implementing correct stroking techniques. The forehand grip can be thought of as shaking hands with the racket. As shown in Figure 4, the racket should be placed diagonally

Figure 4. The racket handle is placed diagonally across the fingers before gripping it



across the open hand with the edge of the handle parallel with the hand's lifeline. The middle, ring, and fifth finger wrap around the racket snuggly and keep it from sliding into the palm. The index finger remains separated from the middle finger and cups under the handle for control and leverage. The thumb closes and rests on the middle finger (Figure 5). As seen from the top, Figure 6 shows the forehand grip with the thumb and index finger making a "V" over the top bevel of the handle, which is an important cue for a proper grip.

There are two primary backhand grips. For all power shots (clears, drives, and smashes), begin with the forehand grip and move the thumb off the middle finger to the left beveled edge of the handle and to a position one-finger width closer to the head of the racket than the index finger (Figure 7). Many highly skilled players hit these backhand shots with the forehand grip. The "thumbs up" backhand grip is used to return smashes and drives directed right at the body (body shots). In this grip, the racket handle is gripped more perpendicular than diagonal with the four fingers. The thumb is placed on the back bevel of the handle about 1 inch closer to the racket head than the index finger (Figure 8). The hand action is a simultaneous

Figure 5. Position of thumb, index finger, and three holding fingers from side view of forehand grip

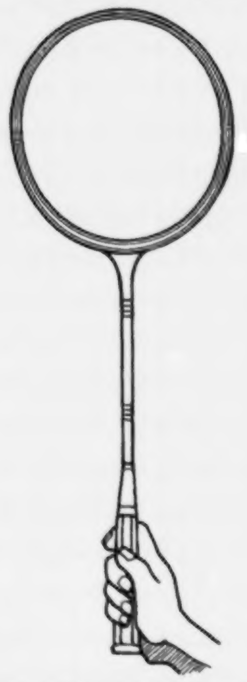


Figure 6. Top view of forehand grip showing the "V" between the thumb and index finger

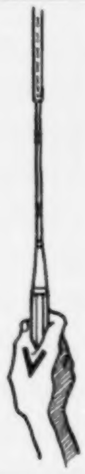


Figure 7. Backhand grip showing thumb placement on oblique bevel

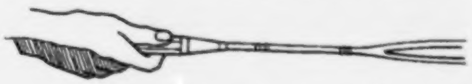
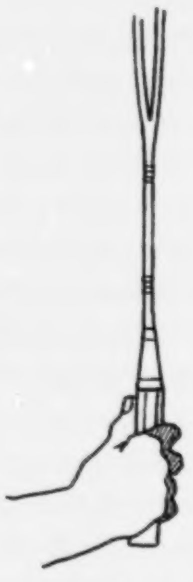


Figure 8. "Thumbs up" backhand grip. Note the thumb position



pushing with the thumb and pulling with the fingers. Gripping the racket near the butt end provides more power, and sliding it toward the racket head (choking up) gives more control for delicate net shots and serves.

Stroking Patterns

The basic forehand and backhand stroking patterns require a combination of wrist, forearm, and elbow movements that make up three phases of all power shots: (1) backswing or cocking, (2) acceleration of racket head through shuttle contact, and (3) follow-through (Table 1).

This sequence of joint movements overlaps but begins with the elbow, is followed by the forearm, and ends with the wrist.

In the standard ready position, stand on the balls of the feet with the knees flexed and feet spread about shoulder width apart and hold the racket head up and in front of the body (Figure 9). From this position, you are prepared to move to any area on the court to retrieve the shuttle.

The overhead forehand power stroke is depicted sequentially in Figure 10a,b,c,d,e. From the ready position, the player (a) moves under the shuttle with both arms extended to maintain balance, (b) takes the backswing, (c) accelerates the racket head through shuttle contact, (d) follows through, and (e) assumes a ready position for the next shot. Note that the racket head is perpendicular to the direction the shuttle is being hit in Figure 10b and d, and that the racket arm is still extended at shoulder height at the end of the follow-through (Figure 10d). The forehand overhead

Figure 9. Ready or base position

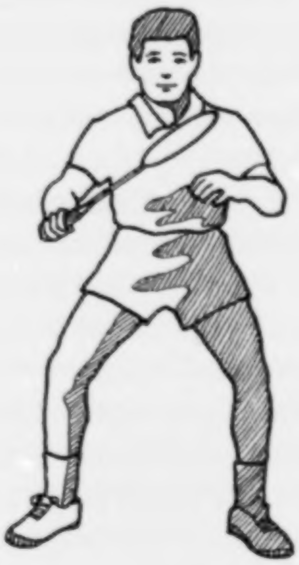
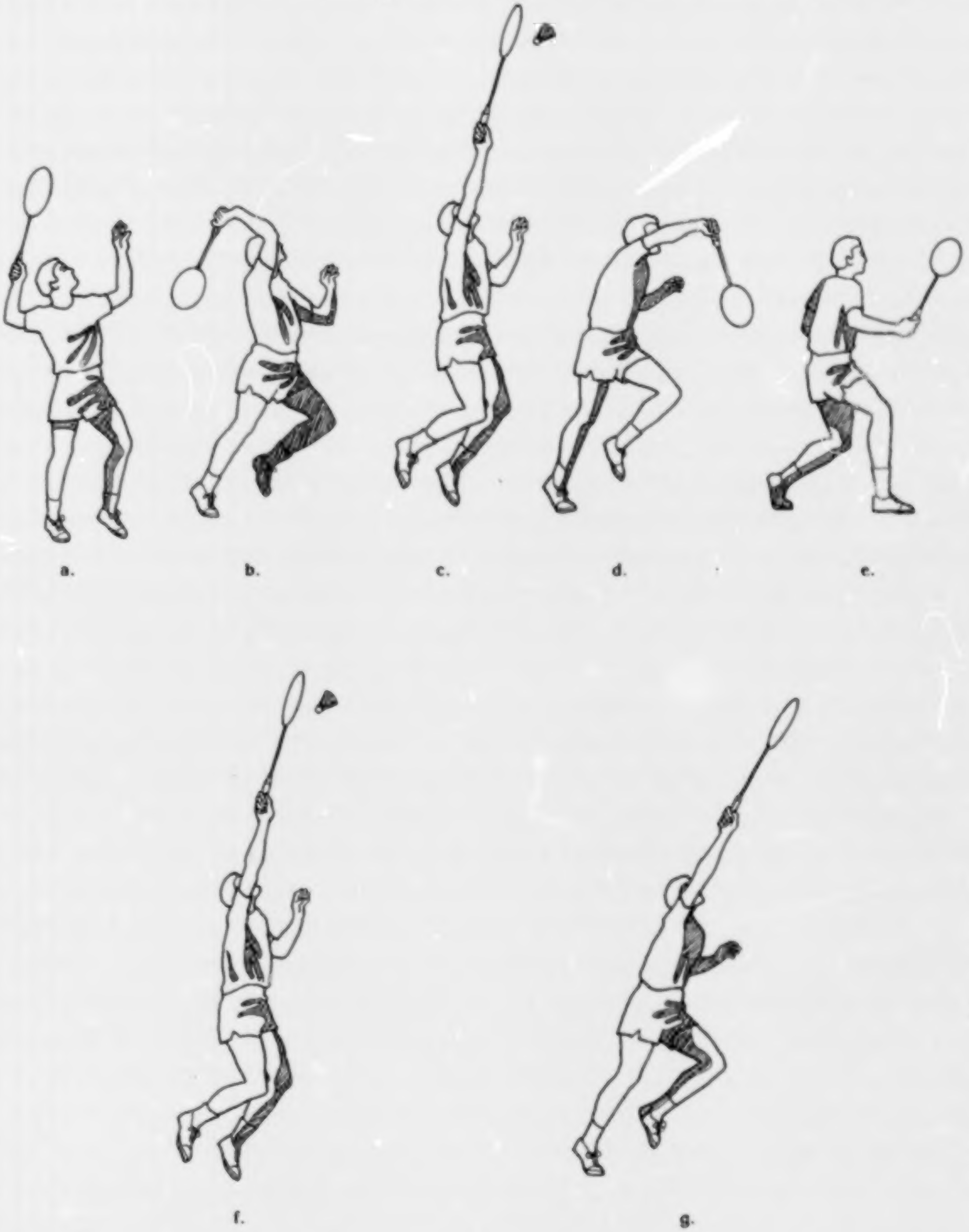


Table 1. Wrist, forearm, and elbow movements for hitting forehand and backhand power shots.

STROKE	MOVEMENT	JOINT	ACTION
Forehand	Backswing	Wrist	Hyperextension, radial flexion
		Forearm*	Outward rotation (supination) 90°
		Elbow	Flexion
	Acceleration through contact	Wrist	Full extension, ulnar deviation
		Forearm*	Inward rotation (pronation) 90°
		Elbow	Extension
	Follow-through	Wrist	Radial flexion, remains extended
		Forearm*	Inward rotation (pronation) to 180°
		Elbow	Flexion
Backhand	Backswing	Wrist	Hyperextension, radial flexion
		Forearm*	Inward rotation (pronation)
		Elbow	Flexion
	Acceleration through contact	Wrist	Ulnar deviation, extension
		Forearm*	Outward rotation (supination)
		Elbow	Extension
	Follow-through	Wrist	Radial flexion, hyperextension
		Forearm*	Outward rotation (supination)
		Elbow	Extension

* Includes internal and external rotation of upper arm

Figure 10. Forehand overhead power stroke: (a) ready position, (b) backswing, (c) contact, (d) follow-through, and (e) move back to base, (f-g) follow-through for forehand overhead drop shot



drop shot is hit with the same stroking motion except that the acceleration of the racket head through contact is reduced by slowing the swing or rotating the forearm more or less than 90° to slice the shuttle and thus reduce the speed of the swing. In this case, the follow-through is depicted sequentially by Figure 10f-g rather than by Figure 10c-d.

The backhand overhead stroking pattern is depicted in Figure 11a-d. Note that in this sequence the player's back is toward the net and the player is

Figure 11. Backhand overhead stroke: (a) ready position, (b) backswing, (c) acceleration, and (d) contact and follow-through

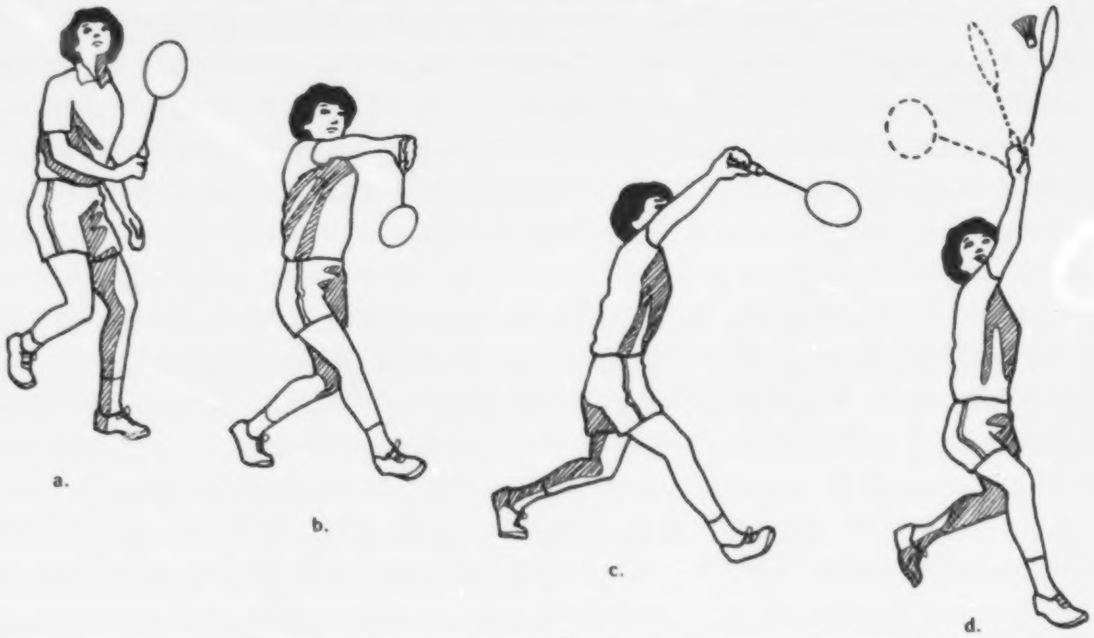


Figure 12. Overhead shot trajectories: (1) smash, (2) clear, (3) attacking clear, (4) attacking drop, and (5) drop

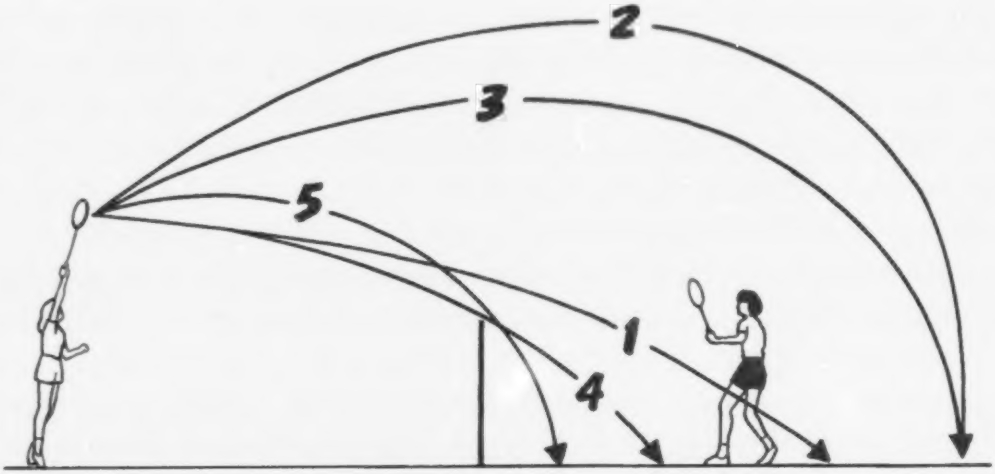
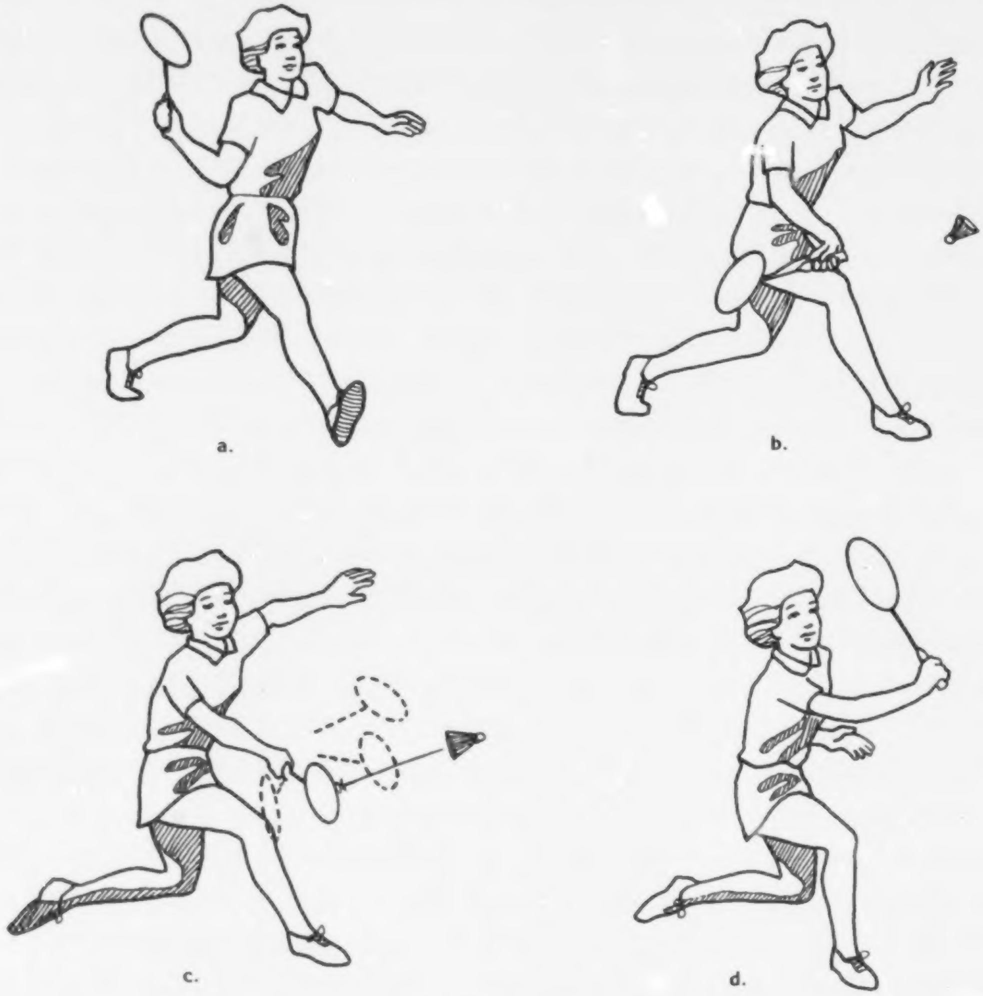


Figure 13. Forehand sidearm stroke: (a) backswing, (b) acceleration, (c) contact, and (d) follow-through



moving toward the backcourt with the right foot contacting the floor about the same time as or just after the shuttle has been hit (Figure 11c,d). The player's right arm will be parallel rather than perpendicular to the net in the follow-through (Figure 11d), while the racket head will be perpendicular to the net and rotated another 90° after contact. The backhand stroking sequence is outlined in Table 1.

In executing all of the forehand overhead shots from the backcourt, you should strike the shuttle with full arm extension and contact the shuttle approximately over the right shoulder for a right-handed player. In addition, the body should be moving upward to contact the shuttle. This is best achieved by a hopping movement from the right (racket) leg to the left and generally striking the shuttle while both feet are off the floor (Figure 10c).

The trajectory of the shots hit from the overhead forehand and backhand stroking patterns are shown in Figure 12.

The sidearm forehand and backhand stroking patterns are hit with a similar striking motion as the overhead strokes. Figure 13 shows the forehand sidearm stroking pattern. Note that the sidearm

stroke begins with a backswing (Figure 13a) very similar to that of the overhead stroke and that the follow-thorough shows complete pronation (Figure 13c). It is important that your final step toward the shuttle is with the right (racket) leg regardless of whether the shot is on the forehand or backhand side of the body (Figure 13). The trajectory of shots hit from the sidearm stroke is shown in Figure 14.

The underhand backhand-stroking pattern is shown in Figure 15a-d. These shots are hit from the forecourt, where power is not a major factor. It is generally important to return the shuttle before it drops

Figure 14. Trajectory of shots hit from the sidearm stroke: (1) clear, (2) attacking clear, (3) drop, (4) half-court drive, and (5) hard drive

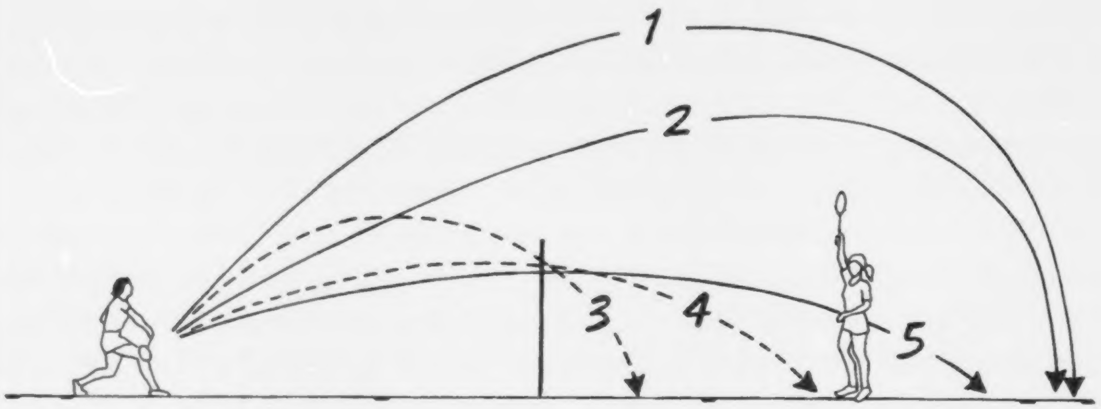
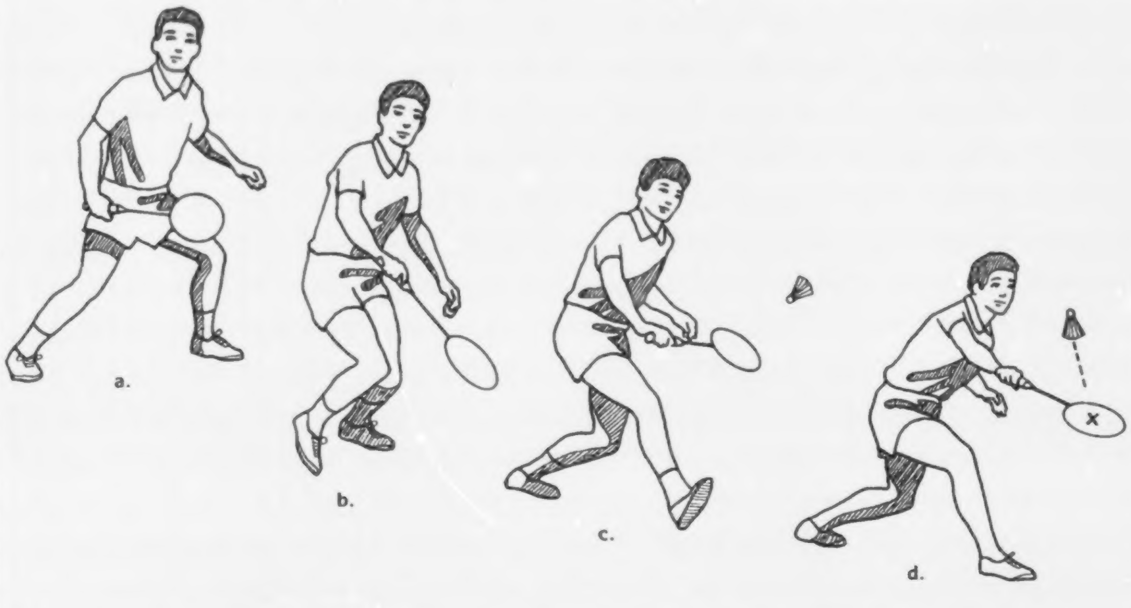


Figure 15. Backhand underhand stroke: (a) ready, (b) backswing, (c) acceleration, and (d) contact



close to the floor to provide as many shot options as possible. These shots are often hit on the run with a long lunge toward the net with the racket leg. In executing either forehand or backhand shots from this court position, you should keep the racket in front of the body so that the racket leg and arm can move forward in synchrony with the elbow over the knee (Figure 15c-d). The trajectory of the shots hit from this stroke includes clears, attacking clears, drives, half-court drives, and drops hit from either the forehand or backhand side (Figure 16).

The stroking pattern is described in detail in Table 1.

Service

The serve is the most important shot in the game because it begins all rallies and is a determining factor in which side will control the rally. The service motion is also used to begin most drills and practice rallies. The singles service is best hit with a high, deep trajectory aimed to land near the back boundary line (Figure 17). The shuttle should be dropped about 2-3 feet in front and 1 foot to the right of the body when standing about 3-4 feet in back of the short service line near the center of the court (Figure 17a). For a legal service, the shuttle must be hit by the racket below waist height with the entire racket head below all of the racket hand (Figure 17d-e). To gain power and consistency, the server should make sure the follow-through carries the racket over the left shoulder (Figure 17g) using the stroking pattern listed in Table 1. A front view of the singles serve is shown in Figure 17h-i.

The best place to hit the singles serve is generally high and deep so as to come straight down near the intersection of the back boundary line and the centerline. From this depth and position on the court, it is most difficult for the receiver to hit a winning shot, and the control of the rally usually remains in doubt. With practice, this serve should be hit very consistently and accurately. A service skill test can be used to evaluate skill and progress by counting how many serves out of 10 land between the back boundary line and the long doubles service line. As your skill level increases, smaller court sections can be marked off using a durable tape. The score achieved is the number of shuttles landing in the designated area out of 10 serves.

The short serve is primarily used for doubles and can be executed with either a forehand or backhand motion (Figure 18). The forehand server usually stands about 3-4 feet behind the short service line with the left foot forward near the centerline. The server cocks the right wrist and drops the shuttle about 2-3 feet in front of and 1 foot to the right of the body. The shuttle is hit

Figure 16. Trajectory of shots hit from the forecourt with an underhand stroke: (1) clear, (2) attacking clear, (3) drive, (4) half-court drive, and (5) drop

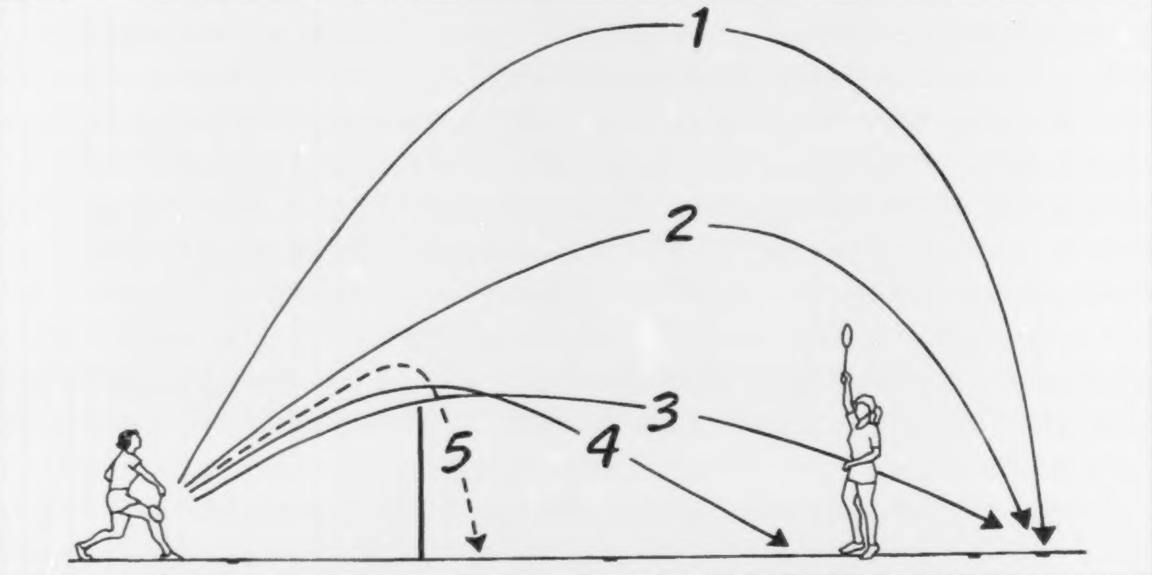
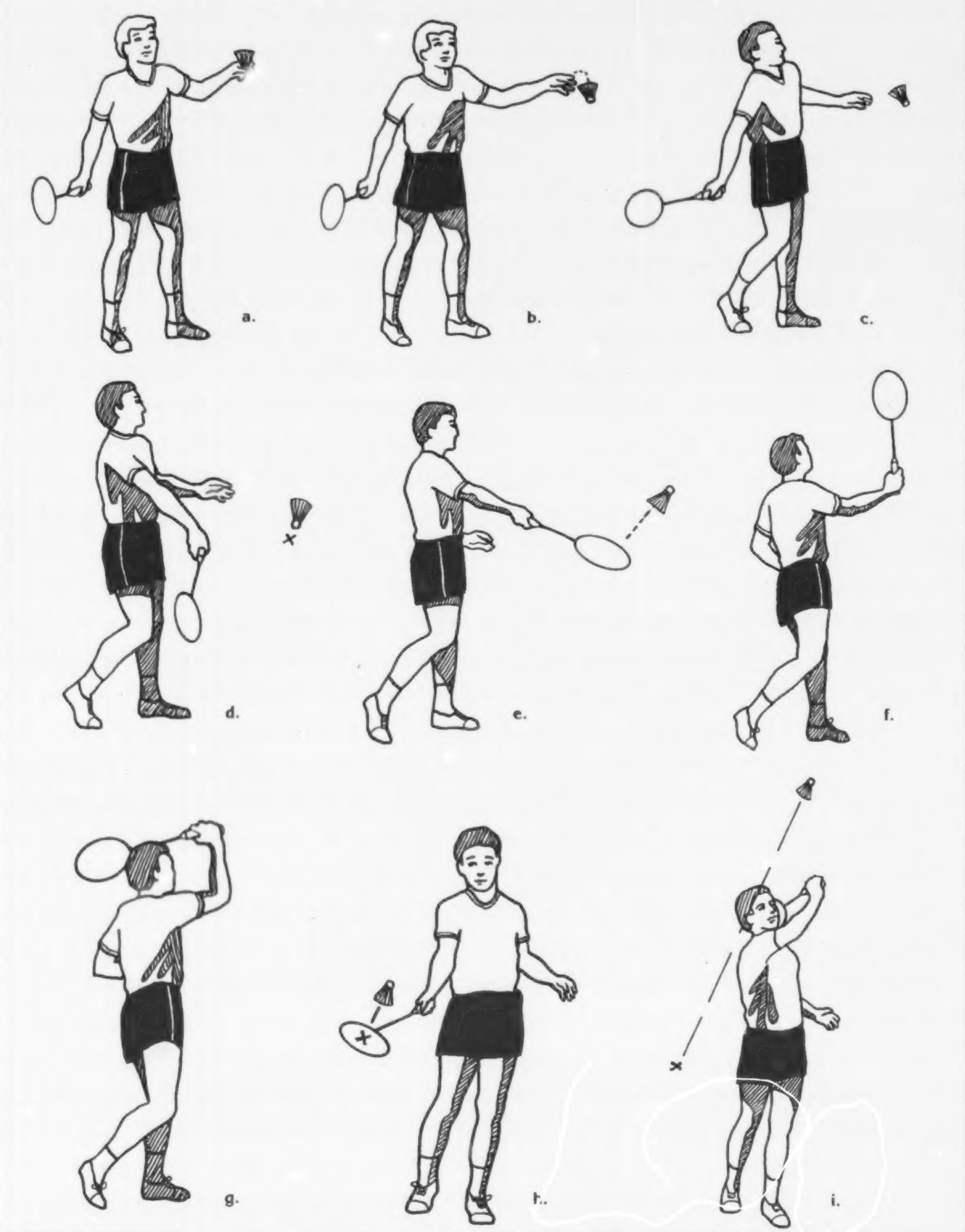


Figure 17. Long service stroke: (a) ready position, (b) shuttle release, (c) backswing, (d) acceleration, (e) contact, and (f-i) follow-through



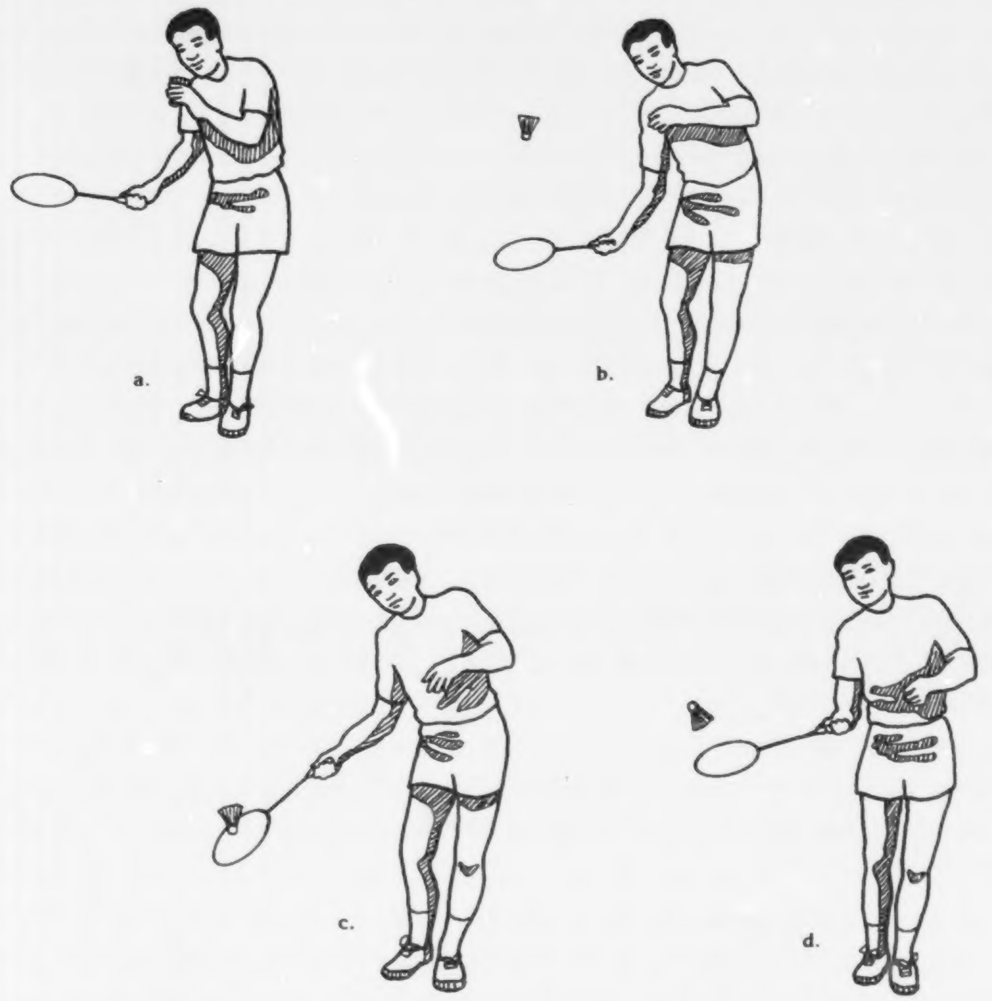


Figure 18. Short forehand serve: (a) ready, (b) backswing, (c) contact, and (d) follow-through

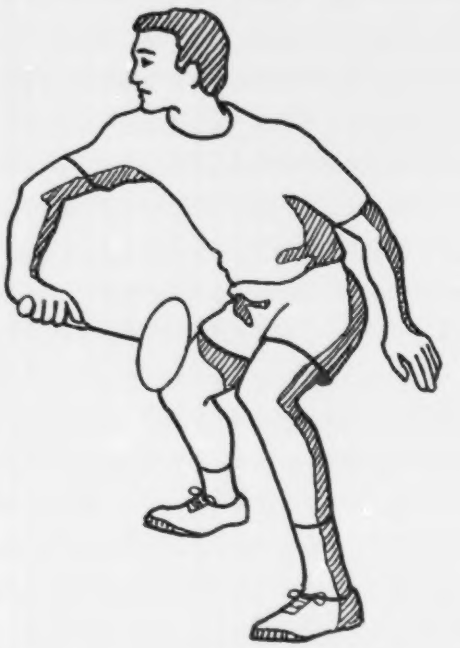
by using a quick pushing motion (elbow extension) and keeping the wrist cocked throughout the motion (Figure 18b-d). The shuttle should be directed to pass just over the net and land just over the short service line near the centerline or be directed right at the opponent's right shoulder. It is difficult for the service receiver to attack the shuttle from these 2 positions.

A short service skill test can be used to evaluate skill and progress by counting how many serves out of 10 land within 1 foot of the short service line. This can be done by taping a line parallel to the short service line across the court from the centerline to the sideline. As skill increases, the line can be moved closer to the short service line. If the standards holding the net are over 6 feet tall, a string can be tied 1 foot over the net to require the serve to pass between the net and string to score a point.

Body Shots

Many players have trouble returning shuttles (especially smashes) that are directed at their body. This situation occurs mainly in doubles. The technique to

Figure 19. Defensive position used to return body shots



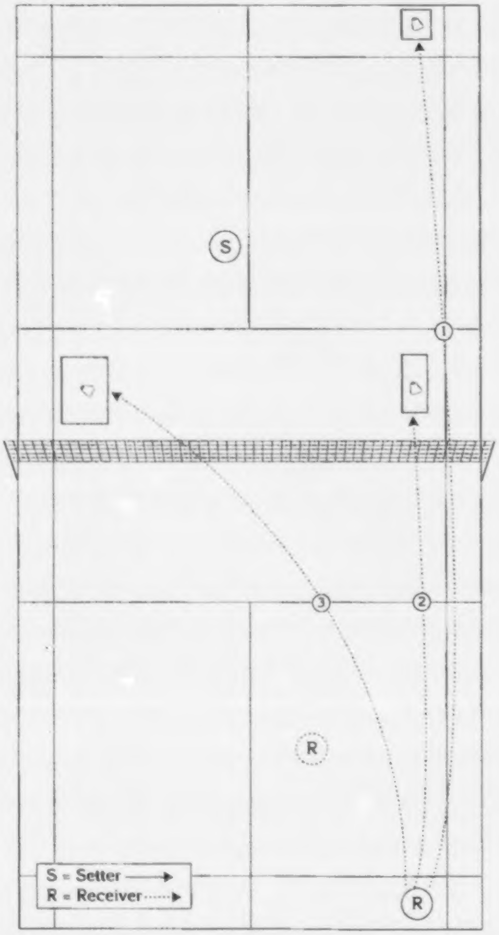
return these shuttles is to take a defensive stance near mid-court with the feet spread about a foot wider than the shoulders and the racket held with the "thumbs up" backhand grip and the arm extended in front of the body (Figure 19). The easiest return is to block the shot back over the net with an elbow extension (judo chop) motion. The safest return is to hit the shuttle hard enough that it will pass close to the net and carry back into the court about halfway (half-court shot), as this shot is very hard for the smashing team to return in doubles.

Practice for Improvement

Initially, the best way to practice badminton is to use training drills. These drills are designed to provide practice so players can learn to hit all shots from each position on the court. Once stroking proficiency is sufficient, players should add competitive games to their drill routines. The simplest drills involve two players facing each other on opposite sides of the net and hitting all clear, drive, half-court drive, or drop shots to each other. For more gamelike situations, the following drills can be used.

1. **High, Deep Serve and Returns Drill:** The server hits a high, deep serve directed to land in a target area in the back alley. The serve return should be a high, deep clear or attacking clear hit straight ahead or a drop shot hit straight ahead or cross-court. The server should hit 30 serves, of which 10 will be hit to each target area (Figure 20). If the serve does not reach the long doubles service line, the returner should let the shuttle drop to the floor so the server can learn to increase power to hit the serve to the proper depth. The server will let the service return drop toward the target area so the returner can learn to hit to the target area.
2. **Underhand Clear and Drop Drill:** This drill begins with the instructor or another student (feeder)

Figure 20. Serve and serve return drill: (1) (attacking) clear, (2) straight drop, and (3) cross-court drop



standing just in front of the short service line and tossing the shuttle with an underhand motion just over the net. The returner, standing about 1 step behind the short service line, will take one step forward with the racket leg and will hit high, deep clears straight ahead or cross-court or drop shots straight ahead or cross-court (Figure 21). If court space is sufficient, the feeder will stand in the center of the forecourt and will alternate feed shuttles to the opponent's forehand and backhand sides. The returner will hit straight and cross-court clears and drops. The feeder should carry about 10 shuttles on the arm and feed them one at a time with the opposite hand.

As skills increase, the feeder will deliver the shuttles at a faster pace and the returner will begin from 2 steps deeper in the court. The last step will always be taken with the racket leg for all forehand or backhand returns in the forecourt.

3. **Clear-Drop Drills:** These drills are designed to practice the overhead drop and underhand clear shots. Player A begins with a high, deep serve, and Player B returns the shuttle with a straight-ahead drop, A hits an underhand clear, and B hits another drop, etc. (Figure 22). Variations of this drill require the players to run up and back in the court to learn to hit the shots on the run. The Clear-Drop-Drop-Drop-Clear drill requires Player A to hit the serve and then alternate

Figure 21. Underhand clear and drop drill: (1) straight clear (2) cross-court clear, (3) straight drop, and (4) cross-court drop

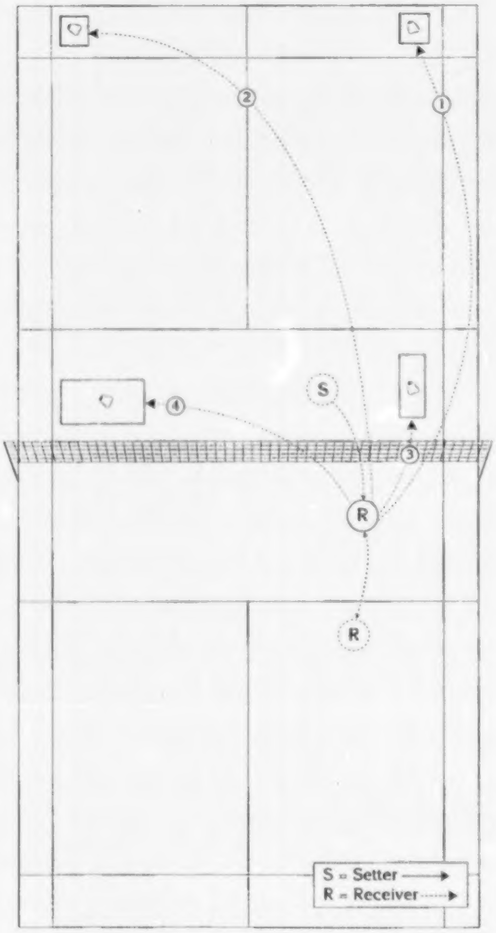
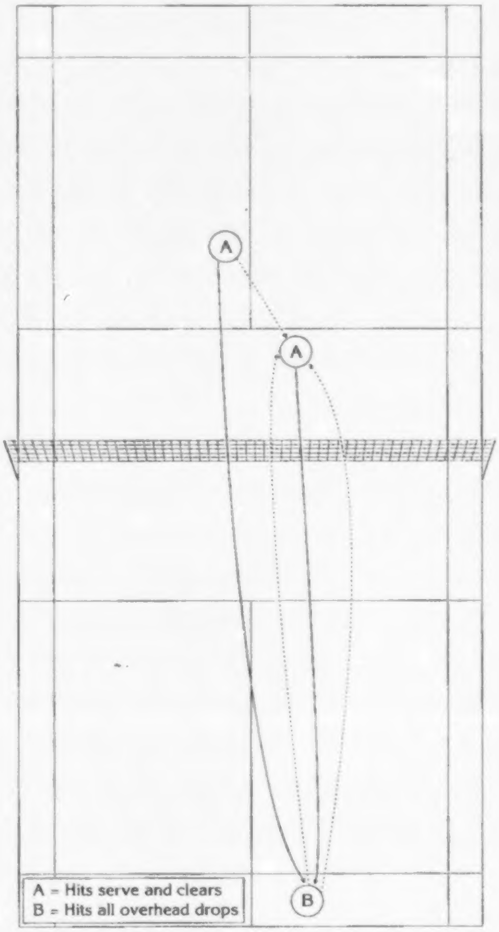
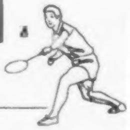


Figure 22. Clear-drop Drill





hitting drop and clear shots while Player B alternates between hitting overhead drops from the backcourt and underhand drops from the forecourt (Figure 23). Another version of this drill that keeps Player B from anticipating where the shot is being hit is to let Player A hit either clear or drop shots in any sequence after the first two hits while player B hits all drop shots.

4. **Clear-Smash-Block Drill:** This drill is excellent for practicing smashes and smash returns and is one of the best drills for improving fitness. Player A hits a high, deep serve, and Player B hits a smash at Player A, who returns the shot with a block shot in the forecourt. Player B hits a clear, A smashes, etc. (Figure 24).

5. **Half-Court Singles Drill:** This drill simulates a real game in that one player begins the rally with a service and either player can hit clear, smash, or drop shots in any sequence. The person winning the rally serves the next shuttle, as in a game. Players can keep score and play short games of 5-7 points and then repeat the drill with another opponent. This drill is played on half the court and uses the centerline and the doubles sideline as playing boundaries.

6. **Drop-Drop Drills:** Player A begins the rally with a short, low serve, and the players then hit drop shots, straight ahead or cross-court, with an underhand stroke hit below net-tape level until a player misses. Shuttles directly in front of the

Figure 23. Clear-drop-drop-drop-clear drill

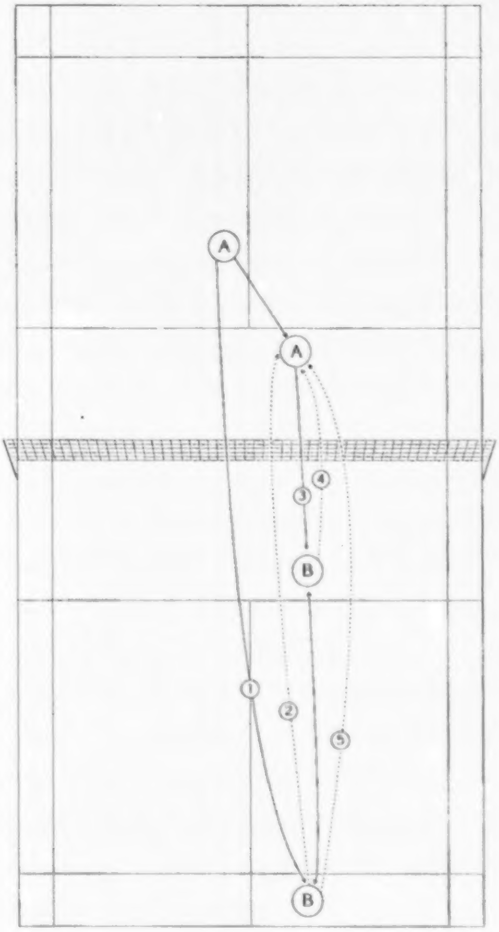
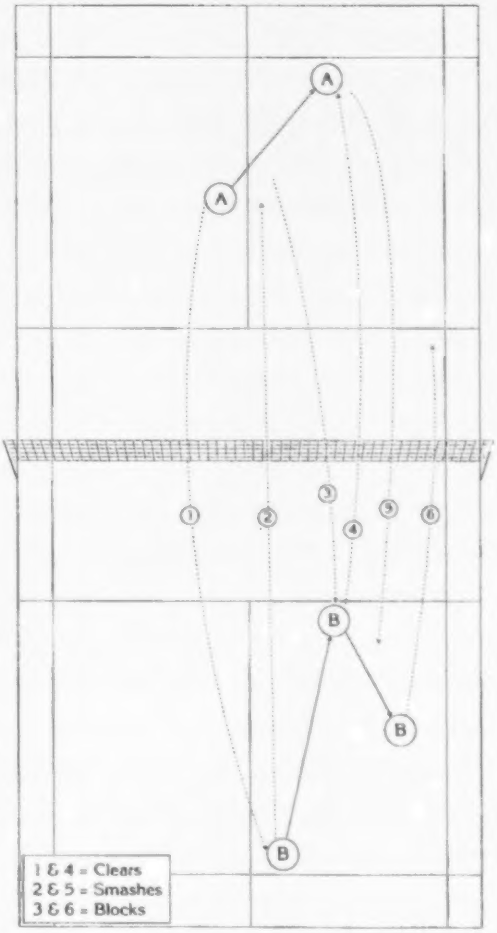


Figure 24. Clear-smash-block drill



body should be hit with a backhand stroke. "King of the Court" is a similar drill where several players are on each side of the court and alternate hitting drop shots and moving to the end of the line. A player missing a shot moves off the court, and play begins with the next player in line serving until one player remains or all players on one side of the net have been beaten.

7. **Forecourt Smash-Backhand Drive Defense Drill:** This drill is one of the best drills for finishing rallies with a put-away shot and for defending against the smash. Player A takes a position about 3 feet in from the long doubles service line and begins the rally by hitting a drive shot at Player B, who is standing straight across the net on the short service line (Figure 25). Player B hits drives at a harder and harder pace with a forehand power shot movement pattern but with the racket arm lowered so the hand just passes over the shoulder. All of Player B's shots are directed at Player A's knees. Player A uses the "thumbs up" backhand grip, assumes a wide stance with the feet parallel to the net and tries to meet the shuttle as far in front of his/her body as possible (See Figure 19). The return should be a half-court shot that clears the net by about 6 inches with a pace hard enough to carry the shuttle about halfway back into the court.

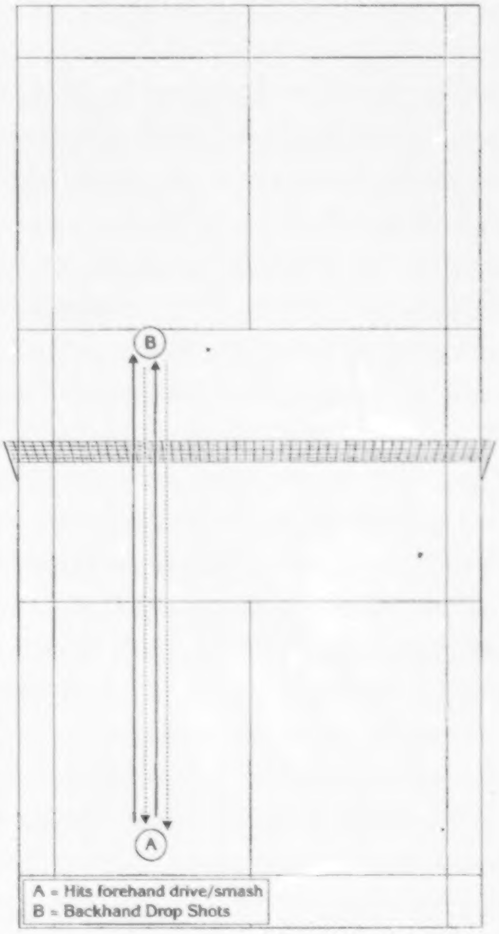
Safety

Although badminton players receive relatively few injuries compared to most sports, players need to warm up well before playing and improve their aerobic power and muscular strength as their skill and the length of rallies increase. Stretching after a hard match is likely to reduce muscle soreness and may help prevent musculoskeletal injuries. The badminton court should be checked for slick spots or debris on the floor that might cause a fall and injury. In doubles matches, players need to be aware of where their partner is and call out to each other ("mine" or "yours") for shuttles hit between them or ones both players are moving toward. When there are several players on one side of the court doing drills they must be careful to stay in their area to prevent getting hit by a racket. Serious eye injuries can be caused by being hit by a smash when playing in the forecourt or looking back to see where your partner is just as he/she is hitting a power shot. The use of protective eyewear could reduce injuries to novice players or or to students in crowded classes. Players should check their rackets to make sure the head or handle is not coming loose at the shaft. A racket head and shaft could break off during a power shot and injure somebody. Players must be trained to stay on their own court during the rallies, and any nonplayers in the gym (especially children) should be careful not to walk onto a court where players are playing.

Equipment

Badminton shoes should be lightweight, flexible, have good gripping and nonmarking soles, and have well-cushioned heels. Although badminton shoes are sold

Figure 25. Forehand smash/drive – backhand drive drill



in Asia and Europe, most Americans use volleyball, racketball or lightweight tennis shoes.

School gym attire is worn for school badminton classes. Most men wear lightweight shirts and shorts, and women wear shorts or skirts and shirts or blouses or tennis dresses. White or pastel colors are in good taste, and school teams or partners often wear matching outfits. Headbands and wrist sweatbands are often worn by players to keep their hair out of their eyes and to prevent sweat from making their racket handles slippery. Protective goggles are recommended for school classes where large numbers of players of differing skill levels are working in crowded areas. These goggles should be constructed of polycarbonate material, which will not break if struck by a racket or shuttle.

Although feathered shuttlecocks have the best flight characteristics, most schools and juniors programs use nylon shuttles. They are about half the cost and have10 times the durability of feathered shuttles. Both feathered and nylon shuttles should be humidified at least 3 hours prior to play, as this greatly increases the shuttle durability. This is most easily done by moistening a paper towel and placing it in the end of a tube of shuttles. Shuttle speed is important and can be tested by hitting a shuttle from the baseline on one side of the court with a full swing toward the opposite baseline. An appropriate-speed shuttle should land within 9 inches (±) of the long doubles service line.

Badminton rackets are constructed of aluminum, steel, or various composites of carbon, graphite, ceramic, boron, or titanium. They weigh 90-100 grams (3 1/2 oz), are generally 26 $^1/_2$ inches long, and are limited to a head length x width of 11" x 9". Most strings are made of nylon with a gauge of 20-22 at a tension of 15-20 lbs. Broken strings can be patched easily without restringing the racket. (Check the USA Badminton home page, *www.usabadminton.org*, for badminton dealers in your area.)

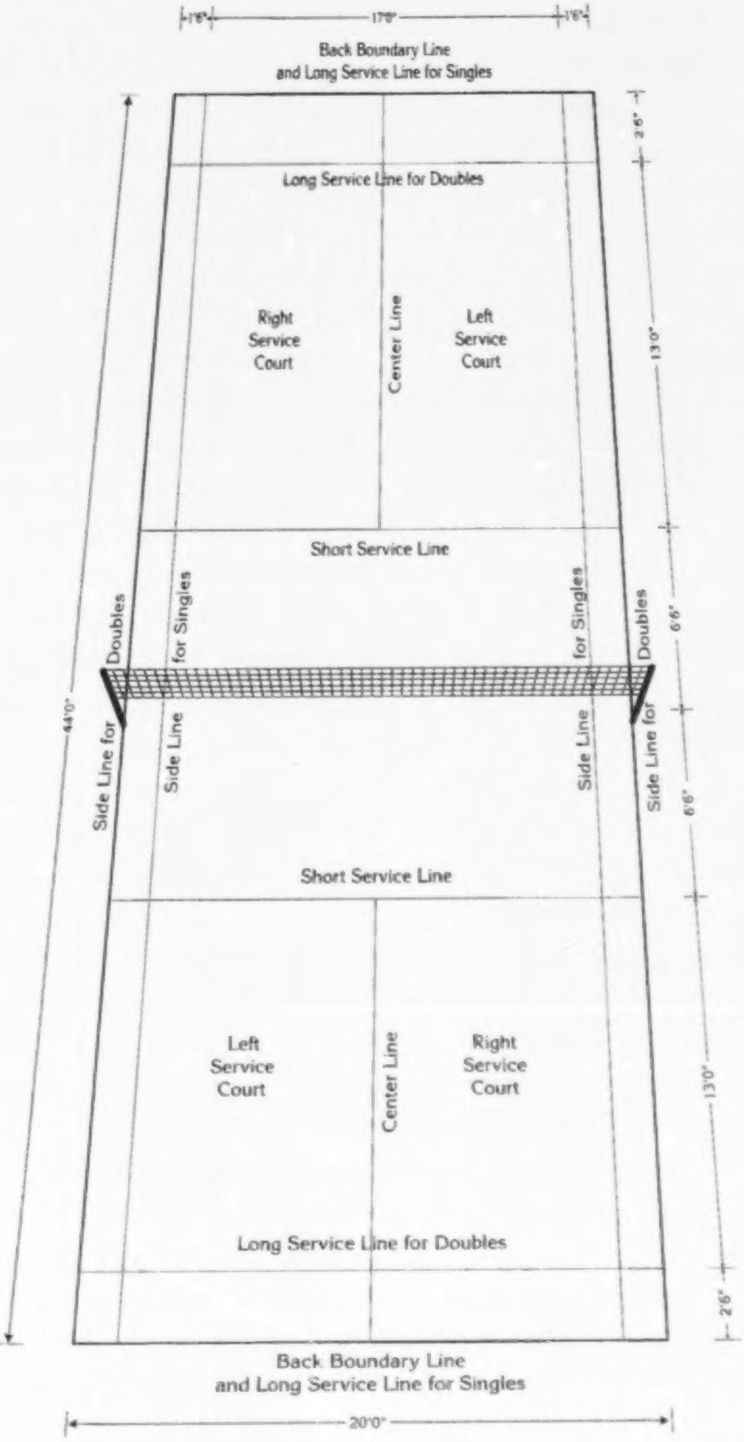
The badminton doubles court is 20 feet wide by 44 feet long. The singles court is the same length but only 17 feet wide. Important court markings and distances are shown in Figure 26. There should be a 4-6 foot separation between courts or back walls and a ceiling height of at least 24 feet. The net divides the court in half and is attached to standards at a height of 5'1" above each doubles sideline and 5'0" at the center of the court.

Competition

Badminton consists of ladies and men's singles, ladies and men's doubles, and mixed doubles (one man and women on each team). Before a game begins, there is a toss to determine who will serve and defend each end. The toss can be a coin flip, spin of a racket, or hit of a shuttle (the winner is the court side the base of the shuttle points toward). The winner of the toss has the option to serve first, receive service, or choose the end to defend. The loser of the toss has second choice. To score a point in singles, a player must win a rally in which that player served. Winning a rally when your opponent serves is a service over, meaning you gain the serve but no points are scored. The match consists of winning 2 out of 3 games. In men's singles and all doubles events, the score is to 15 points. If the game is tied at 14 to 14, the player or team scoring 14 points first has the setting option of playing 3 more points to 17 or not setting, thus keeping the game to 15 points. There is no other setting option if the game is not set. The ladies singles game is 11 points. If the game is tied at 10 to 10, the first player to 10 has the option to set the game 3 points to 13 or no set, thus keeping the game at 11 points. Players change sides after each game. If a team or player wins one game and loses the second, a third game with the same scoring procedures will be played after a 5-minute rest period. Players will change sides, in the third game only, after the first player or team reaches 8 points in men's singles and all doubles events and at 6 points in ladies singles.

When starting a game, the server will serve diagonally from the right (even) service court to the opponent's right (even) service court. After the serve, the players will hit the shuttle back and forth until one player is unable to return the shuttle safely over the net into the opponent's court. If the server wins the rally, a point is scored (1-0), and the server will serve from the left (odd) court. If the server loses the rally, it is service over (the other side serves), but no point is scored. In singles, the server will serve from the even (right) court if he/she has 0 or an even number of points. Service will be from the odd court if he/she has scored an odd number of points. In doubles, each player will serve until he/she loses a rally, and then the partner will serve until he/she loses a rally. For the first service of the match, however, only the person in the right court will serve until losing a rally. When the other

Figure 26. Badminton court


1'6"
17'0"
1'6"
Back Boundary Line and Long Service Line for Singles
Long Service Line for Doubles
Right Service Court
Center Line
Left Service Court
Short Service Line
Side Line for Doubles
Side Line for Singles
Side Line for Singles
Side Line for Doubles
Short Service Line
Left Service Court
Center Line
Right Service Court
Long Service Line for Doubles
Back Boundary Line and Long Service Line for Singles
44'0"
2'6"
13'0"
6'6"
6'6"
13'0"
2'6"
20'0"

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team is serving, the player beginning the game in the even court will receive from the even court when his or her team has an even score. The player who begins a game in the odd court will return service from this court when his or her team has an even score. For example, if it is service over and your team is serving and leading 7-4, the player beginning the game in the left court will be serving from the right court. The receiving team will return service from the side of the court in which they began the game. In the second or third game, either player can begin play in the even court.

Faults are violations of rules, which result in the loss of the rally. Some of the major faults are as follows:

1. During service, it is a fault if the racket head is not below the server's hand or the shuttle is hit above the server's waist.
2. If the shuttle lands outside the correct boundary lines, passes under the net, or gets caught in the net, it is a fault.
3. If the shuttle touches the ceiling, a player or the clothing of a player, it is a fault.
4. It is fault if a player touches the net with any part of the racket or his/her body or clothing.
5. It is a fault if a player reaches over the net to contact the shuttle. It is not a fault if your racket follows through over the net as long as the

Figure 27. Serve return and play options from the backcourt

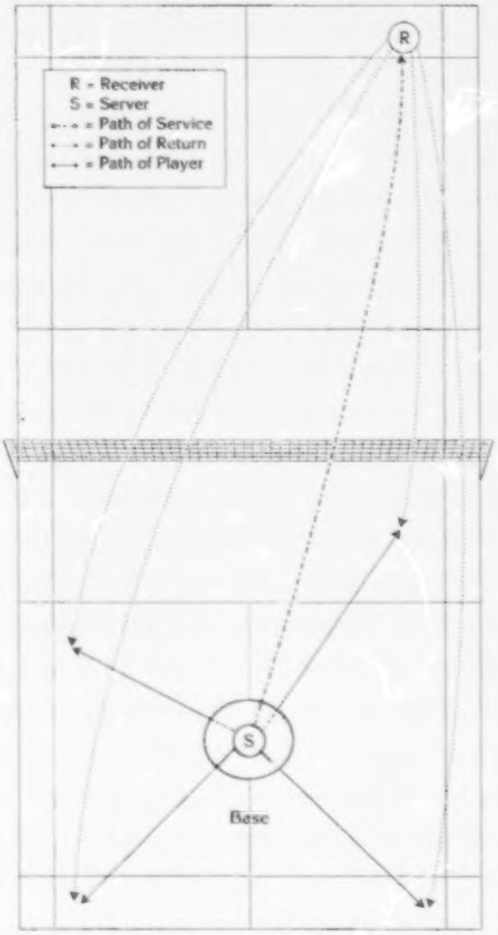
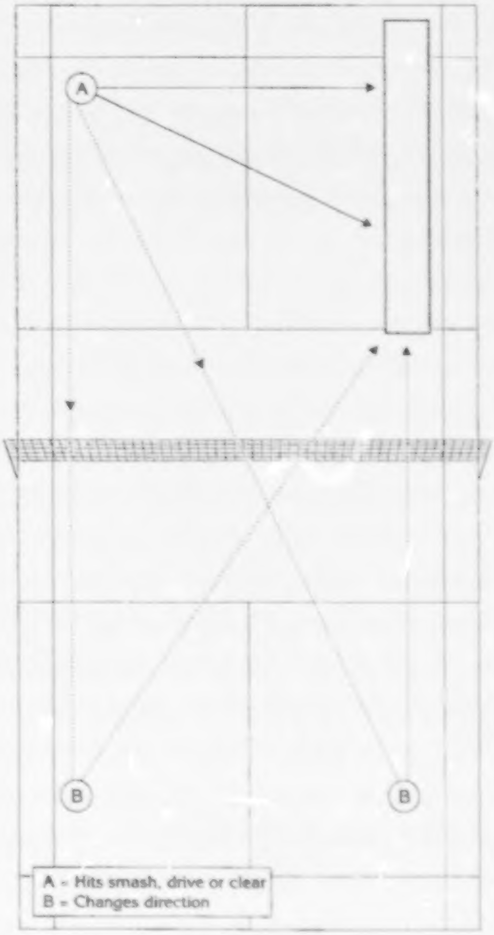


Figure 28. Strategy to force Player A to run cross-court



shuttle is hit on your side of the net and the net is not touched while the shuttle is still in the air.

6. It is a fault if a player intentionally swings his/her racket so as to distract the opponent's downward shot at the net. Putting the racket in front of the face for protection is allowed.
7. It is a fault and double hit if one player hits the shuttle twice in attempting to hit the shuttle over the net. It is also a double hit and fault if both players on one team hit or touch the shuttle before it is returned over the net.
8. If a player is hit with a shuttle, regardless of whether standing in or outside the court, it is a fault.

Tactics

Badminton is a game in which offense and defense may change from side to side several times during a rally. You are on the offense when you can hit the shuttle downward (smashes and drops) or past your opponent with drives and attacking clears to the deep corners of the court. Defensive shots are hit upward (clears) and give your opponent the opportunity and time to hit smashes. With players of equal ability, the team maintaining the offensive pressure should win 60-70% of the rallies.

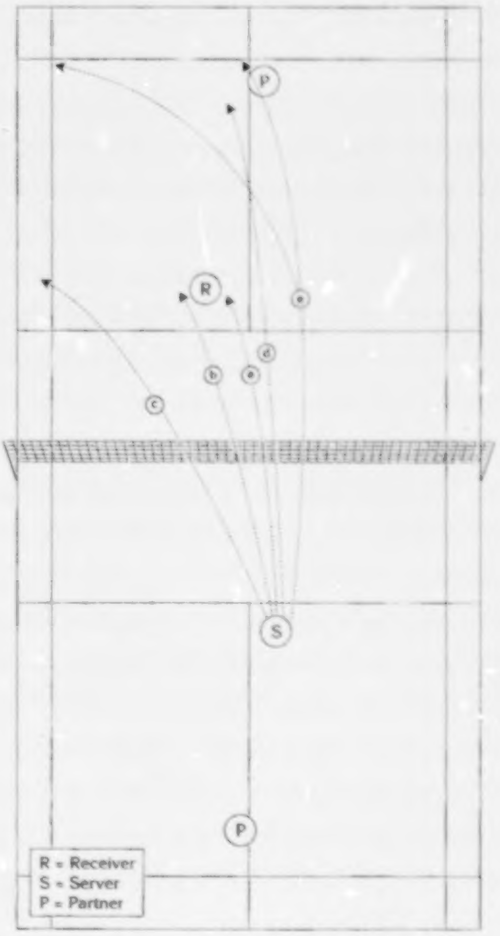
Playing style and tactics depend on the player's strengths and weaknesses. The following three styles of play are common:

1. **Power:** This style of play depends heavily on deep clears, fitness, and aggressive smashing ability. This player must be physically strong but could be less skilled in tactics, deceptive play, and pinpoint accuracy.
2. **Counterattack:** This style of play depends on the player's quick movement, fitness, and agility in retrieving the opponent's shots. This style does not require great power or finesse but consistency and patience to wait for an opening to counterattack.
3. **Finesse:** This style of play depends on deceptive stroking ability. The strategy is to maneuver the opponent out of position with quick, deceptive shots and then hit winning placements into the open area of the court. This player also depends on fitness but may not have overpowering strength.

Many tournament players practice all three styles, which gives them flexibility in countering their opponent's style of play and game plan.

It is easy to make an unforced error but more difficult to hit a winning shot. Using this premise, players should take chances when serving because the error only results in a service over and not the loss of a point. When receiving service, players should be more conservative and try low-risk shots. An unforced error here is a point scored by the opponent. This strategy can be accomplished by effective serve returns that force the opponent to move out of position and to try difficult or risky shots to keep the shuttle in play.

Figure 29. Doubles service options: (a) toward "T", (b) toward receiver's racket shoulder, (c) toward sideline, (d) drive down centerline, and (e) flick over receiver's head toward sideline or centerline



The basic singles strategy is to run your opponent up and back, from side to side, and on the diagonal until he/she hits a weak return that can be smashed or hit into an open court for a winner. A drop shot to the forehand followed by an attacking clear to the backhand is particularly effective in making the player run the diagonal (farthest distance) and attack the weak backhand. The rally generally begins with a high, deep serve, which is followed by one of the following service returns: (a) attacking or high, deep clear, (b) straight-ahead drop, (c) cross-court half-court smash or cross-court drop, or (d) cross-court attacking clear (if the player has sufficient power) (Figure 27). The shots to be hit following the return of service are based on the player's experience, imagination, and feel for where the opponent or open court is. A good strategy in singles is to hit mainly straight-ahead shots (Figure 27a,b), and when your opponent hits cross-court, make him/her run the diagonal by hitting another straight-ahead shot into the open court (Figure 28). All of these shots draw the defender away from a base position as shown in Figure 27.

Doubles rallies generally begin with a short service directed to the center third of the court (Figure 29), followed by a series of low drives, half-court shots, and drops until one team is forced to hit a clear and

Figure 30. Doubles service return options: (1) drop to sideline, (2) half-court drive, (3) clear or drive to backcourt sideline, (4) drop to center, (5) drive at server's partner, and (6) cross-court drive or clear

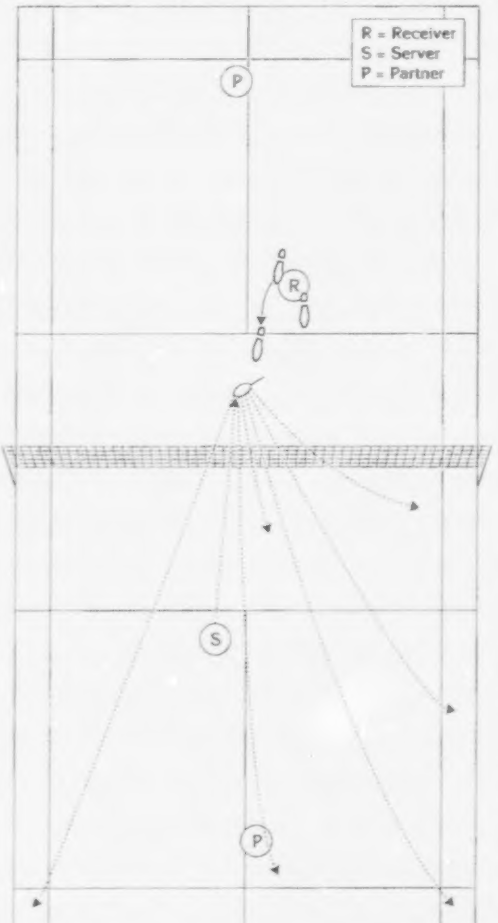
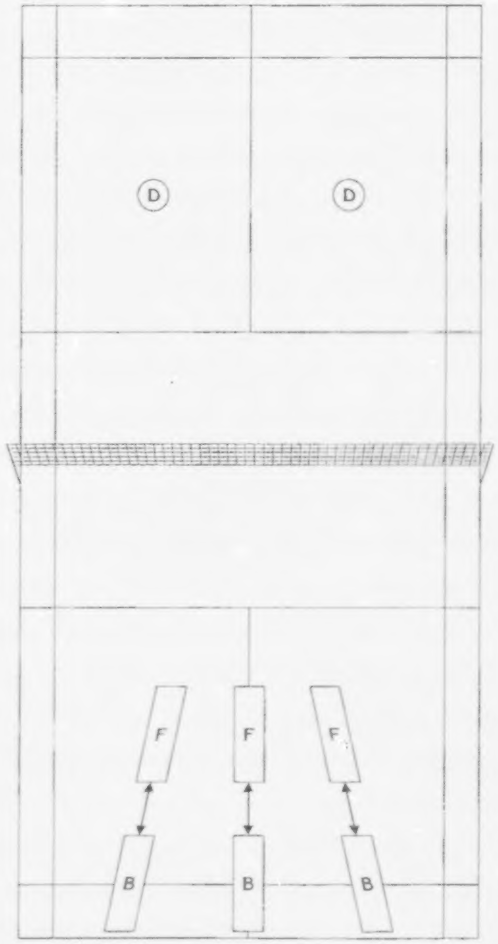


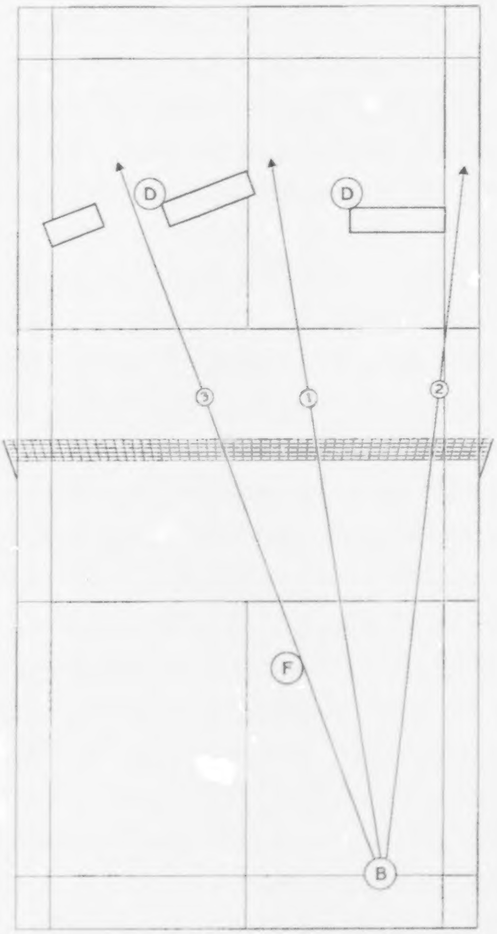
Figure 31. Doubles defensive and attack formations. Forecourt (F) and backcourt (B) players move in tandem

Defensive Formation



Attack Formation

Figure 32. Smashing targets in doubles: (1) between centerline and straight-ahead defender, (2) straight-ahead sideline, and (3) sideline side of cross-court defender's body



go on the defensive. The serve return options are shown in Figure 30. For these first few shots, the server and returner generally play in the forecourt, and their partners play in the backcourt near their positions for the service (Figure 30). Once on the attack, the players should take one of the three tandem positions (so both players are in line with the shuttle) as shown in Figure 31 and hit smashes, drops, and drives until the rally is won. The defending team should play side by side and try to reverse the attack by hitting drives and half-court shots down the sidelines. Smashes hit between the defenders should be returned by the cross-court player, as it is easier to hit half-court shots away from the attackers from this court position. It is also difficult to defend against high smashes directed at the opponent's racket shoulder. The best attacking targets are those shown in Figure 32 because blocked returns from these areas are generally hit in the direction of the attacking team's frontcourt player. The shaded areas are poor targets because it is easy for the defender to reverse the attack from these positions

Resources For Continued Participation

The easiest to find and most current information on badminton in the United States is found on the USA Badminton home page at *www.usabadminton.org.* Here you can find information on rule changes, tournament schedules and results, equipment suppliers, memberships, camps and clinics, films, current news, and where to play. In addition, the International Badminton Federation home page is at *www.intbadfed.org.*

USA Badminton publishes several magazines, including *Badminton USA*. Membership in USA Badminton is nominal, and this magazine is included with all memberships. Clubs can also purchase liability insurance for very low rates through USA Badminton. The address for USA Badminton is One Olympic Plaza, Colorado Springs, CO 80909.

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CHAPTER 6

Basketball

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Introduction

Basketball is an American game designed by James Naismith in 1891 to accommodate football players in their off-season conditioning and recreation program. It has evolved after more than a century of play from a slow-moving, low-scoring game with rudimentary skills to a fast-paced, high-scoring, acrobatic, physical game. Through its history of more than 100 years, it has evolved into a city game played by individuals of all ages and sizes on asphalt playgrounds and gymnasiums throughout the United States. It is an international game played at the Olympic level by countries from all over the world. In fact, players from countries including Australia, Italy, Greece, Estonia, Lithuania, China, Brazil, and Russia excel at the game. In the United States, competitive basketball games at the high school and collegiate level are highly structured events sponsored by high school activity associations or federations, and by the NCAA and NAIA collegiate athletics associations. The game at the international level and the professional game are institutionalized so that the very fiber of American society is touched by the game. Implications related to economics, politics, religion, social stratification, and mobility are clearly part of the game in the new decade of the 2000s.

Perhaps one of the most dramatic changes in basketball in the past 15 years has been the significant increase in participation by girls and women, who now play basketball both within the United States and internationally. Accompanying an increase in participation is a tremendous increase in skill level. Girls as young as elementary school age are now participating in organized basketball leagues and have extended play to unorganized playground participation experiences where they have developed their individual skills and established a more free-form movement to their play.

The game, for all basketball players today, is an individual game blended into a team concept. It is a stylistic, aesthetic game played with physical domination. It is a game that requires stamina, endurance, strength, and balance. And it is a game measured not only in points scored by a team to determine a winner, but in the style and appearance of acrobatic moves that enhance individual performance.

Basketball is a part of the secondary school physical education curriculum. It is also an integral part of interscholastic athletics and intramural sports programs. The skills and strategies associated with basketball are of great importance when class instruction is considered, but it is also important to not lose sight of the American character and value development related to the game. To be able to play basketball with enthusiasm, skill, and knowledge promotes a joy for physical activity and for the game of basketball.

Terminology

Box out. A rebounding technique designed to screen the offensive player from the basket.

Changing directions. To dart quickly from left to right and vice versa.

Follow-through. The continuation of the body movement after a skill is executed.

Feed. The act of passing the ball to a player in a position to score.

Flow. Being in a rhythm with the game and the emotion of play. Often associated with instinctive, nonthinking play.

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Goose neck. The description of the position of the forearm, wrist, and hand on the follow-through of a free throw or jump shot.

High dribble. Dribble used for speed in an open court area.

Low dribble. Dribble used for protection of the ball in a congested area.

Outlet pass. The initial pass that starts a fast break.

Pick. A position an offensive player takes to screen a defensive player.

Pivot. The act of turning by lifting one foot off the floor and turning on the other foot to face in a different direction.

Player-to-player. An individual defensive formation still often called a man-to-man defense.

Rotation. The backspin imparted to the ball as it is released.

"Styling." The aesthetic part of the game usually associated with an individual move that can be defined as a "beautiful move."

Takeoff foot. The foot opposite the shooting hand used to push off from the floor when shooting a layup.

Top of the key. The position on the court at the top of the free throw circle.

Touch. The feel of the ball.

Transition of play. Changing from defense to offense and quickly attacking the other team offensively. Also called a fast break.

Fitness Requirements

It is important to recognize that the game of basketball is a physical game that requires agility, stamina, quick reflexes, jumping ability, speed, eye-hand coordination, and strength. Playing the game at a competitive level requires a high level of fitness. Playing a pickup game or participating in an instructional or recreational setting may not require the same level of fitness, but to perform successfully and safely, a reasonable level of fitness is necessary. Space doesn't permit an in-depth presentation of how to gain fitness for basketball, but a few points related to running, stretching, strength, and agility can be of help in getting started.

Running

Running should be incorporated into any physical preparation designed for basketball. This should include both long-distance and short-sprint efforts. The long-distance running, an aerobic activity, builds the endurance demanded in a game of basketball.

Sprinting a series of short distances of up to 30 yards establishes an anaerobic aspect to the fitness level that will allow a player to go full tilt for short bursts during a game.

Stretching

Flexibility is required for success in basketball. It is required in order to be able to move with a degree of grace and in order to avoid injuries. Consequently, it is important to establish the habit of stretching prior to playing. Rules of stretching require placing a muscle group on stretch for not more than 60 seconds, never stretching to the point of pain, and making sure the stretch is held and that you move slowly into and out of the stretch. There are numerous stretching exercises, but, for basketball, it is important to stretch the back, arms and shoulders, upper and lower legs, and the groin area.

Strength

A basketball player needs strength for both the lower and upper body. Legs need to be developed to enhance jumping ability, and upper body strength is needed in order to be more productive when rebounding, passing, and shooting. Weight lifting should emphasize the quadriceps, hamstrings, and gastrocnemius muscles for the lower body, and the shoulder area, biceps, triceps, and forearms for the upper body. There are countless strategies to lifting weights to develop these muscle groups. Strength is developed through repetition and sets. Either free weights or weight machines can be used effectively to develop strength

Movement

Movement is an essential element in basketball. To move with agility, to have quick reflexes, and to be graceful is important. Basketball coaches assist in developing agility through various drills designed for that purpose. Cones or lines on a basketball court are often used as marks designed to create situations that reflect agility. Stopping and starting, cutting laterally, and changing directions are all part of these drills. An individual player, practicing alone, can simulate these same drills. Playing the game creates similar movements, and the more a player works on these movements in a game both with and without the ball, the better the player will become at them.

Skills

There are six basic skills associated with the game of basketball, regardless of the level of play. They are dribbling, passing, receiving, shooting, rebounding, and defense.

Dribbling

Dribbling is an individual skill. Used effectively, it contributes to overall basketball success. Dribbling enables a player to advance the ball the length of the court and to maneuver within the confines of the court boundaries. Used appropriately, dribbling is needed to penetrate a defense in order to set up a pass or to beat a defensive player one-on-one. It is used to set up an offensive play in order to control the tempo of a game. Dribbling contributes to the concept of one-on-one, two-on-two, and three-on-three play. When all five players are actively involved in an offensive situation, dribbling becomes a far less significant part of the overall play.

There are two basic forms of dribbling: 1) high dribble for speed, typically with a lot of court in front of the dribbler (Figure 1), and 2) a low bounce to the dribble used in the half-court game (Figure 2).

Fundamentally, the dribble should be executed with the head up rather than looking down at the ball. This allows a player the vision to find and pass to open teammates. When using a low dribble, the body should be positioned so that the ball is protected with the nondribbling arm flexed to block an opponent's effort at stealing the ball. In a confined area of the court, the dribbler's body should be in a flexed position. The ball is dribbled primarily with the fingers rather than the palm. The arm and hand movement consists of a pushing action along with a "touch" when contacting the ball. In other words, don't hit the ball—use finesse and push the ball.

Figure 1. The high dribble

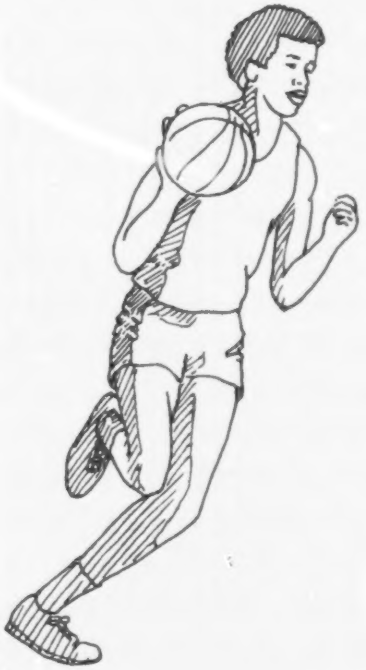
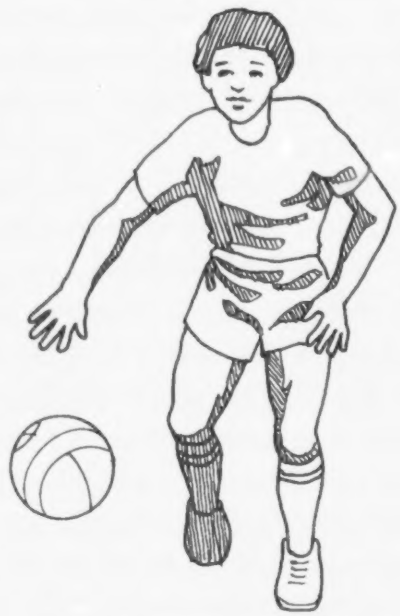


Figure 2. The low dribble



Following are fundamental points to remember when dribbling the ball:

- Be able to use either hand equally well when executing the dribble.
- When dribbling, develop the skill of penetrating the defense and passing off the dribble.
- A low dribble requires the positioning of the ball slightly in front of the body but protected by the nondribbling arm.
- Develop the skill of dribbling, stopping, and pivoting.
- Learn to change pace and direction with the dribble.
- Use both the crossover and drop-step dribbles to advance the ball.

- Look for both the open teammate to pass to and the open shot off the dribble.

Intermediate fundamental skills associated with the dribble include a crossover and drop-step dribble. The crossover dribble is a simple action of pushing the ball from one hand to the other in order to change directions. The ball tends to be positioned out in front of the dribbler but still protected with the nondribbling arm. It is a quick action move that is used to avoid the defensive player (Figure 3). The drop-step dribble (Figure 4) requires three distinct moves:

- With the right hand dribbling the ball and protected with the left arm, the ball is dragged to the backside of the right leg and the left leg is used as a pivot leg.
- While maintaining the left leg pivot position and dragging the ball with the right hand, the back is turned to the defensive player and the ball is switched to the left hand.
- Dribbling with the left hand, the body continues its turn until the ball is on the left side of the dribbler with the right arm protecting the ball and the direction of the body movement has changed to a more left direction.

Advanced skills include "styling" that occurs by dribbling behind the back and between the legs. The

Figure 3. The crossover dribble

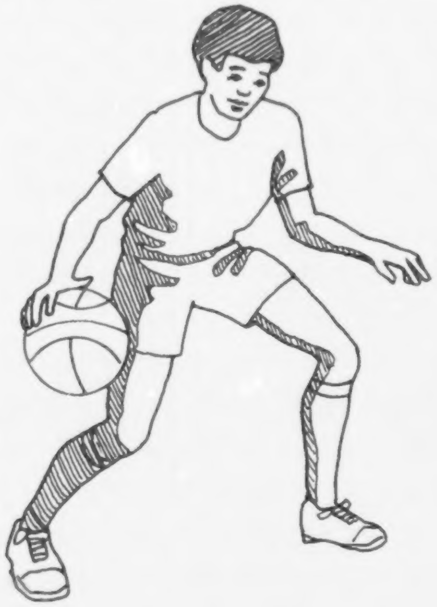
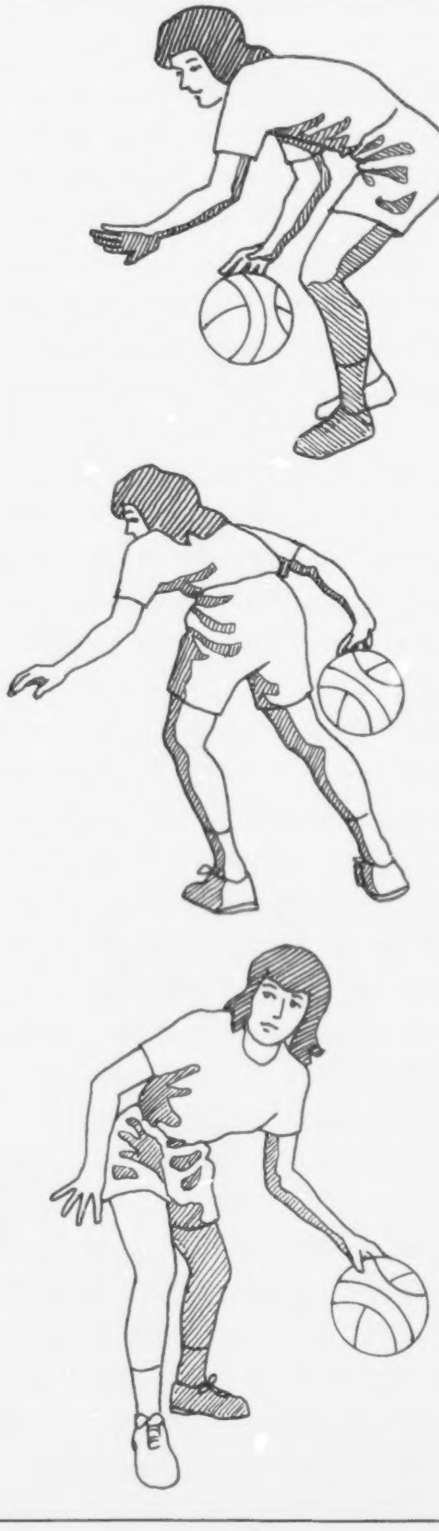


Figure 4. The drop-step dribble



game is so advanced today that these "styling" moves are common with many players, and for those players who advance to a high level of play, it is important to develop a "styling" form of dribble skills.

Passing

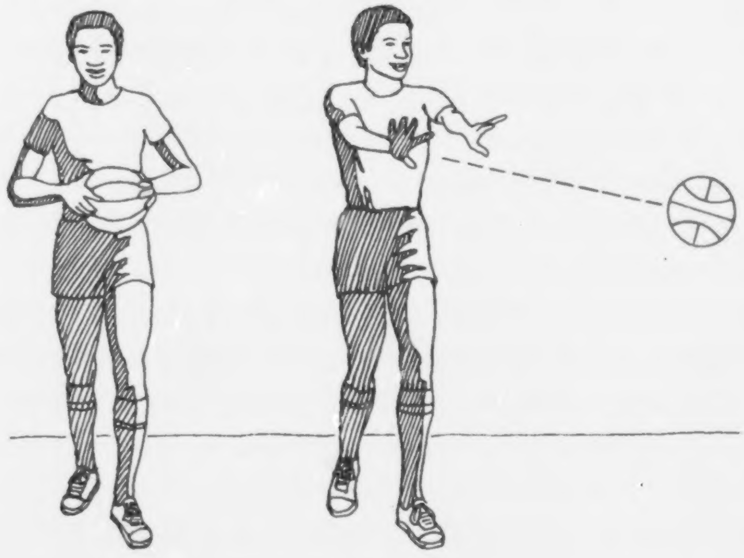
Passing the ball effectively is critical to basketball success. Combined with the dribble, a skillful pass becomes extremely effective in two-on-two situations when one player is willing to "give up" the ball by feeding it to a teammate. When a team situation is established with three-on-three, four-on-four, and five-on-five situations, the pass is a requirement in order to make the offense work. In mismatch situations like a three-on-one fast break, the pass plays a major role if the end result is to score. The pass is also instrumental when attempting to slow down the tempo of a game or protect a lead near the end of a game. The bottom line is that the pass is what makes basketball a team game, and it is the skill that allows teammates to share for the good of the team.

There are many types of passes. The most basic passes are the two-hand chest pass, two-hand bounce pass, two-hand overhead pass, and the baseball pass. Passes that are more individualized or relate to "styling" and "flow" of the game include the shovel pass off the dribble and the behind-the-back pass. These "styling" passes become fundamental for advanced players, and those players who work at developing advanced skills should be encouraged to develop these passes.

The chest pass is the most fundamental of all passes. It is made as an outlet pass following a rebound or steal, when passing the ball in from out-of-bounds and when moving downcourt and passing off the dribble. It is also a fundamental skill associated with running an offense. The player can make a chest pass, shoot a jump shot, or dribble when the ball is initially positioned at chest level, making the chest pass a significant threat to the defense. The pass is executed by holding the ball close to the chest and directly in front of the body with the fingers of both hands on the sides of the ball and thumbs in back (parallel to each other). The elbows are pointed outward to protect the ball but still reasonably close to the body. As the pass is executed, the arms are extended forward with one leg stepping toward the intended receiver of the pass. As the weight of the body is transferred forward and the arms extended, there is a snap of the wrists at release of the ball, ending with the palms of the hands positioned outward and the thumbs pointed downward. The ball is released with an intended target of the receiving player's chest (Figure 5).

The bounce pass is executed in a similar fashion to the chest pass. The passing action is the same except the body is lowered as weight is transferred forward to complete the pass, and the floor becomes the immedi-

Figure 5. Two-hand chest pass



ate target before arriving in the hands of the receiver (Figure 6). It is a slower pass than a chest pass, which makes it easier to intercept, but it is also a deceptive pass, particularly when passing between players to a teammate cutting to the basket.

The overhead pass is most often used to "feed" the big player under the basket or as an outlet pass following a rebound. When executing the overhead pass the hands are positioned on each side of the ball and toward the back, with fingers widespread. The thumbs should be pointed toward each other. The ball is held above the head, and the pass is initiated by a short step toward the passing target. As the weight is transferred forward, the arms are extended and the wrists snap as the ball is released. The follow-through is completed with the arms forward and thumbs and palms down (Figure 7).

The baseball pass is executed just as a baseball or softball might be thrown. The problem is that a basketball is much larger than a baseball or softball;

Figure 6. Bounce pass

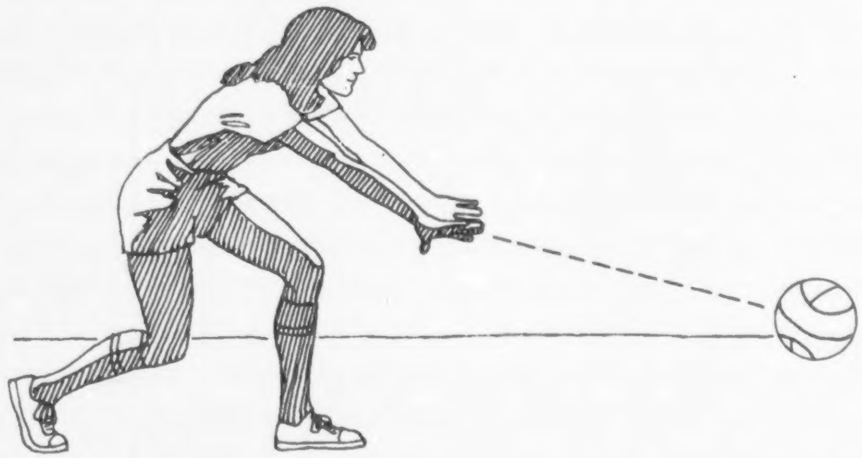
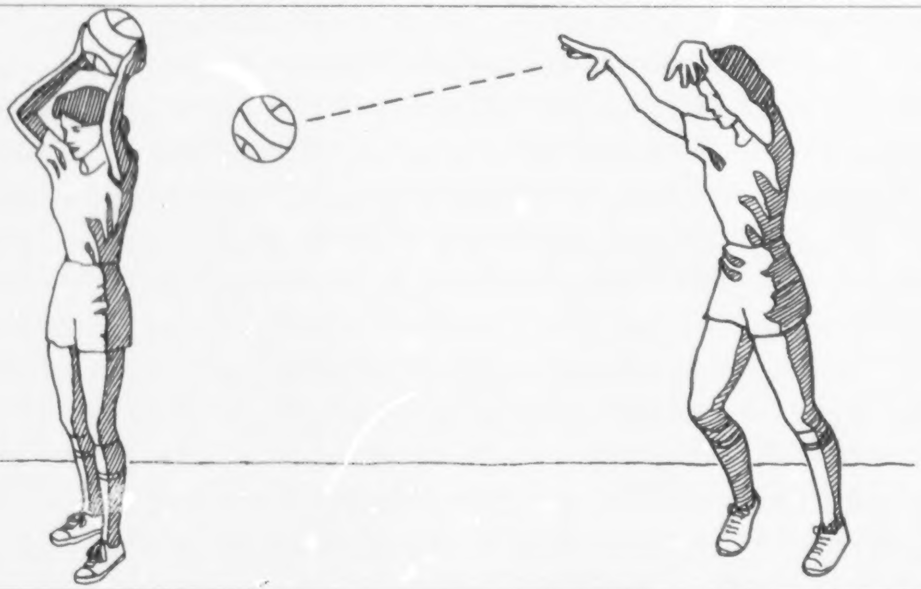


Figure 7. Overhead pass



consequently, it is more difficult to control. When a player's hands are small, the player can use the non-dominant hand to support the ball as it is cradled in the passing hand. The pass is executed off the shoulder with the dominant hand throwing the ball and the non-dominant hand keeping the ball from falling out of the hand until the pass is made. As with the other passes, there is a weight transfer as the body moves forward and the arm extends toward the target. At release the wrist is snapped, imparting distance and accuracy to the pass (Figure 8).

Fundamentally, passes have to be timed to meet the receiver's movement. The passer also has to keep the head up in order to look for an open teammate.

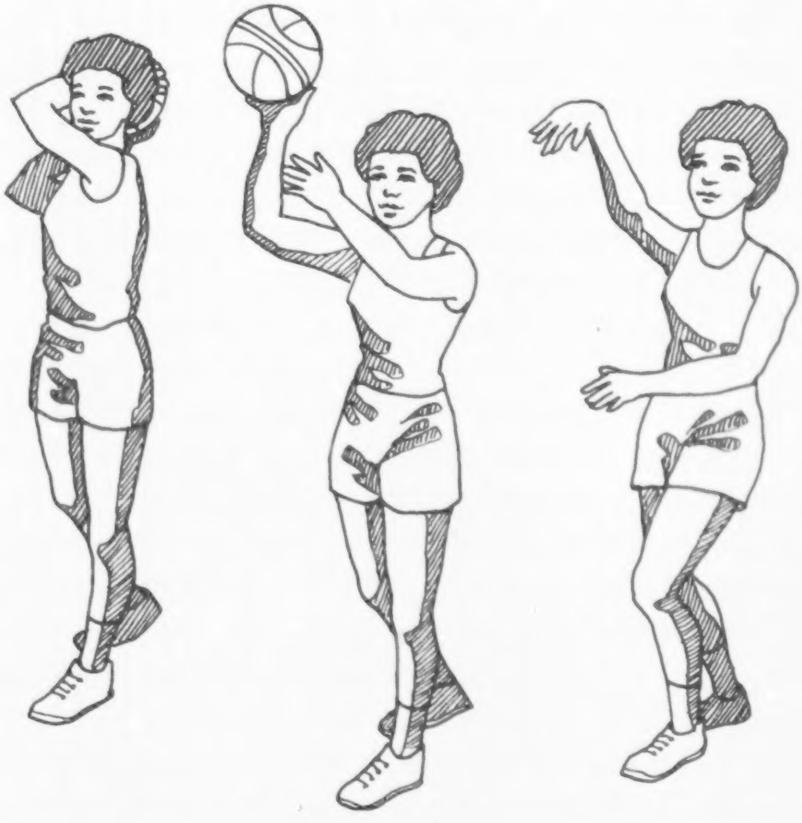
Here are points to remember when passing the ball:

- Try to always emphasize correct form.
- Remember to control the ball with the fingers.
- A wrist snap at release of the ball imparts spin on the ball, making it easier to catch.
- It is important to not telegraph passes by looking directly at the intended receiver.
- Learn to execute passes while on the move and while a receiver of the pass is moving.
- The chest is usually the target for completion of a pass, with the exception of the overhead pass. Trying to pass inside to a tall player requires a pass above the receiver's head.
- After fundamentals are developed, passing off the dribble and behind the back are acceptable skills to work on.

Receiving

A pass is only successful when caught effectively. The receiving player must "see" the ball and track the ball into "soft" hands. "Soft" hands means that the receiver of a pass needs to catch with the fingers and give with the hands, wrists, and arms, absorbing the impact of the ball. It is also important that the receiver meet the

Figure 8. Baseball pass



pass. That is, the receiver must physically step to the ball and meet it, and then the absorption of the force of the ball occurs. Passes should be caught with both hands if at all possible (Figure 9).

Once the pass is caught, the options for the player are to shoot, pass, or put the ball on the floor to dribble. These options need to be practiced as a continuation of the skill development of receiving a pass. To simply stand and hold the ball after receiving a pass is a negative reaction in the game of basketball.

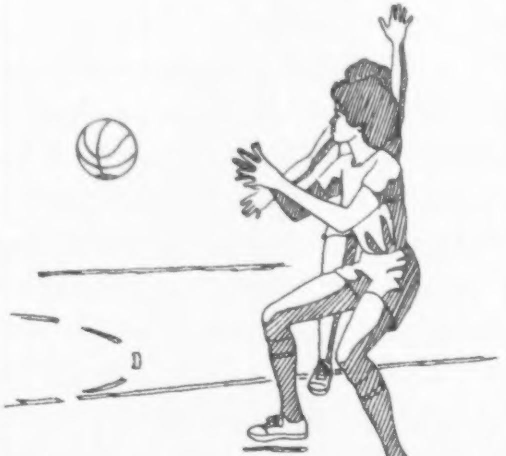
Following are points to remember when receiving a pass:

- When possible, try to catch a pass with two hands.
- Meet the pass by stepping toward the flight of the ball.
- Catch the ball with the fingers and absorb the force by giving with the hands, wrist, and arms.
- See the ball from release to receipt of the pass.
- React after catching the ball by continuing the offensive effort.

Shooting

Shooting a basketball is for many basketball players the most enjoyable part of the game. There are specific fundamentals associated with shooting a layup, free throw, or jump shot. The layup is an easy shot to execute, given the development of the fundamental skills. The free throw is nothing more than a set shot without defensive interference, and the jump shot is fundamentally quite similar to the free throw.

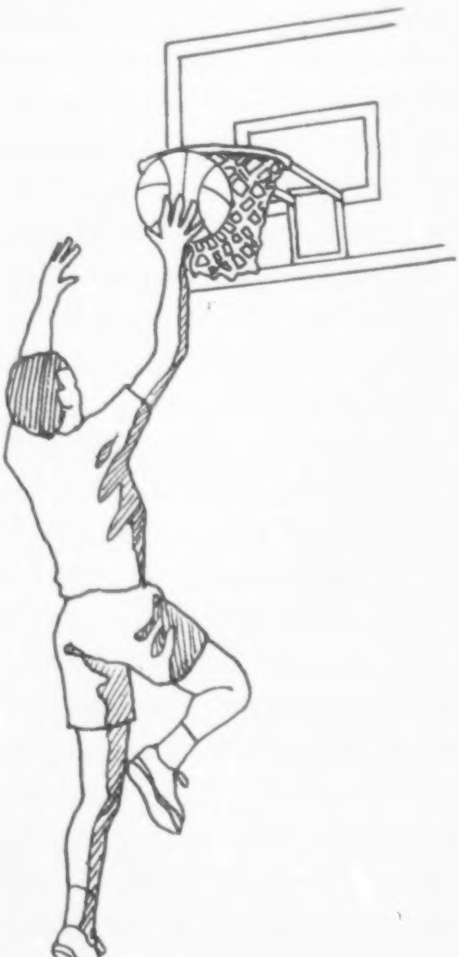
Figure 9. Receiving a pass



Lay-up

Shooting a layup requires an explosive jump, a feather-like "touch" when releasing the ball, and the versatility to shoot with both the right and left hand. When shooting a layup, a player is either moving quickly, usually in a fast break sequence, or the player is under the basket with defensive players offering some degree of opposition. The angle to the basket when shooting the ball can be from a side or in front of the basket. The preferred angle is from the side because the backboard becomes a target for the shot.

Figure 10. Shooting a layup



A layup from a fast break situation requires an entry from the side. If coming from the right side of the basket, the shot should be taken with the right hand. The backboard is the target area. The ball should be placed softly on the backboard about a foot and half above the rim and within the rectangle section nearest the shooter. The shooter should explode upward, jumping off the left foot with the right side of the body and the right arm extended toward the target. The palm of the shooting hand should face the backboard at release, and the ball should be released at the peak of the jump. The nonshooting arm and side of the body should serve as protection, blocking the defensive player from reaching and deflecting the ball (Figure 10). If the shooter is coming down the left side of the court, the only changes are shooting with the left hand and jumping off the right foot.

Shooting a layup when under the basket requires an explosive jump from a standing position. As the player begins the jump, the body needs to lean toward the basket with a strong physical movement. The shot can be taken with either hand, depending on which side of the basket the player is shooting from. Again, the ball is laid softly off the backboard and the nearest rectangle target. In this situation, it is imperative that the nonshooting arm and body protect the ball during the jumping and shooting phase (Figure 11).

Once the fundamental layup is developed, there are countless variations that defy fundamental structure, including reverse layups, a front-rim approach, a "wrong foot" jump, and, of course, the dunk. These are more advanced skills that incorporate acrobatic moves and should be developed as a player matures.

The following are points to remember when shooting a layup:

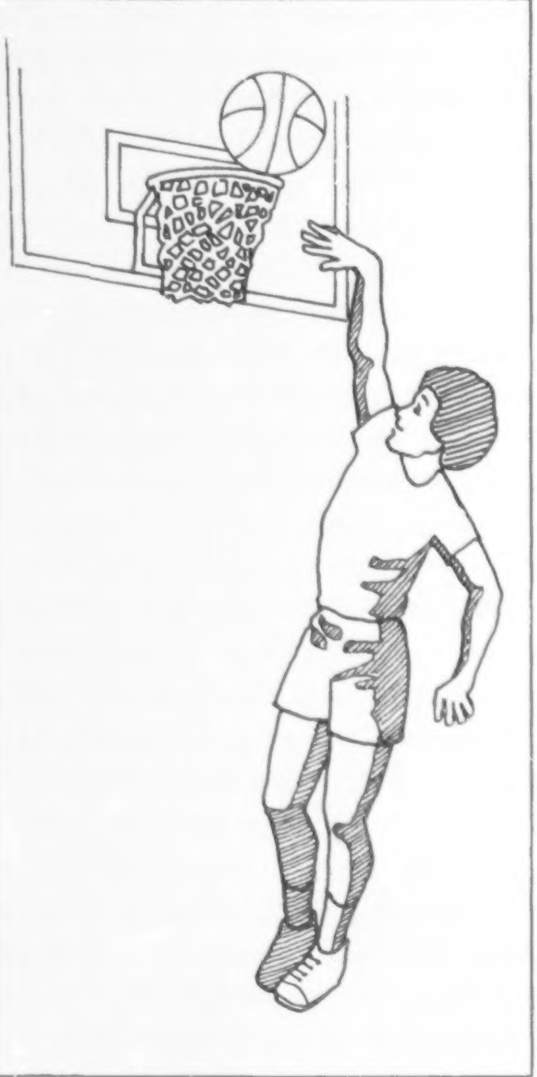
- Look at the rectangular area of the backboard as the target.
- Place the ball softly off the backboard.
- Shoot left-handed off the left side of the basket and right-handed off the right side.
- Transfer horizontal movement when approaching the basket to an explosive vertical jump.
- Start the jump with the ball positioned at about waist level and extend the body and arms.
- Protect the ball from the defense with the nonshooting arm and body from the beginning of the jump to the release of the ball.
- When shooting a layup from within five feet of the basket, an explosive jump with a strong physical movement is required.

Free throw

The free throw is perhaps the easiest shot to execute because there is no defense to play against. Shooting a free throw with success requires confidence, concentration, relaxation, and consistency. Through sustained practice, skillful shooting can be accomplished.

Several stances can be used, but it is important to find one that feels good and stay with it. Typically, the most comfortable position is to place the feet shoulder

Figure 11. Shooting a layup from within five feet of the basket



width apart with the foot of the shooting hand slightly in front of the other foot. A fluid, rhythmical, relaxed motion is used when shooting a free throw. The motion begins with the bending of the legs followed by an extension of the legs at the release of the ball. Within that movement there is a subtle rotation of the body that allows for an alignment of the shooting side of the body in line to the basket. The ball is shot with the fingers and heel of the shooting hand, not the palm. The ball should be positioned between the waist and shoulders with the elbows in at the beginning of the shot. As the legs reach full extension, the ball is moved from the waist/shoulder position and is released at the forehead level. At release, the forearm extends from the elbow with a break at the wrist best described as a "goose neck." This gooseneck position provides backspin rotation to the ball that gives it direction. It also enhances shooting touch. The shooter should focus on the front of the rim as if attempting to reach out and drop the ball over the rim. In order to accomplish this effort, the ball is shot with an arch that clears the front of the rim. The final follow-through action is a slight forward movement of the body with the weight balanced on the balls of the feet (Figure 12).

Reminders to reinforce the free throw shooting technique include:

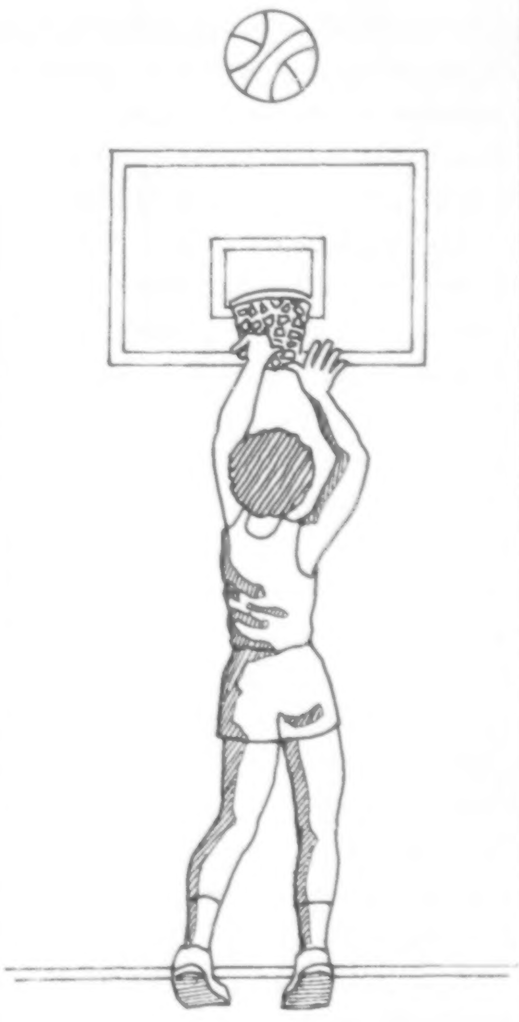
- Relax and concentrate.
- Shoot the ball with spread fingers and the heel of the hand.
- Be consistent by using the same stance and rhythmical motion on each shot.
- Be fluid and natural by bending and extending the legs from the beginning of the shot to the release of the ball.
- Allow the body to rotate on its long axis so that the shooting side is facing the front rim at the release of the ball.
- Complete the shot by extending the arm and forming a "goose neck" at the release of the ball.
- Shoot with an arch.

Jump Shot

The jump shot is a more difficult shot. There are two basic types: the continuous and the delayed. The continuous jump shot form is simply a jumping extension of the free throw, whereas the delayed jump shot form requires a jump with release of the ball at the peak of the jump.

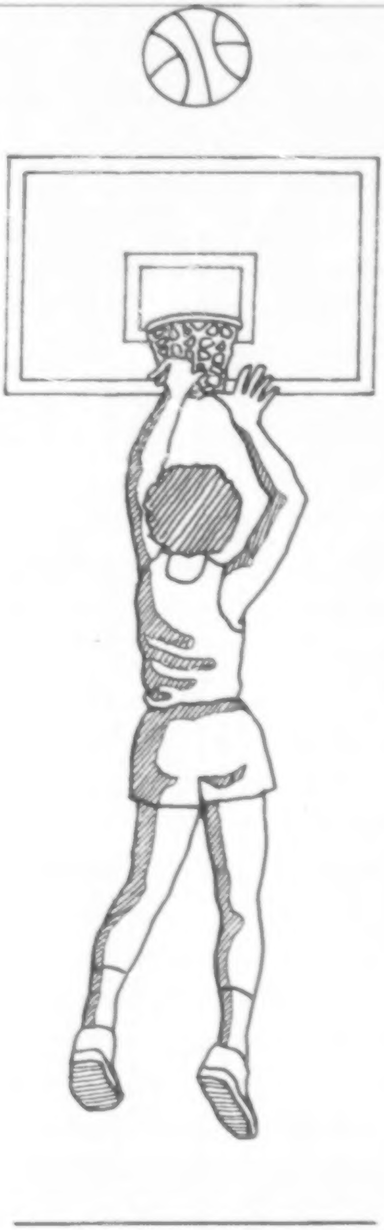
Both jump shots require an extension of the arm and hand with a "goose neck" position at the release of the ball, which imparts backspin to the ball as well as an arch that allows the ball to clear the front rim of the basket. The ball is controlled with the fingers and heel of the shooting hand with the nonshooting hand positioned at 90 degrees to the shooting hand, thus providing control and balance to the ball. The arms and elbow need to stay close to the body. Both jump shots also require a rotation of the body on the long axis. As the shooter faces the basket and jumps upward, there

Figure 12. Shooting a free throw



is a natural rotation of the body that permits the alignment of the shooting side of the body (i.e., shoulder, elbow, wrist, hip, knee, and ankle) ending with the shooting side partially facing the basket at the completion of the shot. When the player jumps there is a bend of the knees followed by an extension of the legs at the release of the ball.

Figure 13. Continuous jump shot



Common aspects of a jump shot technique include:

- Release the ball with a "goose neck" position.
- Shoot with an arch.
- Control the ball with the fingers and heal of the hand.
- Use the nonshooting hand to control and balance the ball.
- Keep the elbows and arms into the body.
- The body rotates on the long axis, aligning the shooting side to the basket.
- The jump requires a bend and extension of the legs.

To best understand the continuous jump shot, imagine shooting a free throw with a jump and releasing the ball on the way up to the peak of the jump. This is a fluid, rhythmical shot permitting the shooter to use the jumping action to assist in projecting the ball to the basket from long-range distance (Figure 13).

Reminders for the continuous jump shot technique include the following:

- Imagine the free throw shooting form with a jump added.
- Release the shot on the way up to the peak of the jump.
- Extend the arm on the follow-through and complete the shot with a goose neck.
- Be fluid and rhythmical throughout the total shot.

The delayed jump shot form requires that the shooter jump within a 3-foot radius (going up and coming down in the same space), and releasing the ball at the peak of the jump (Figure 14).

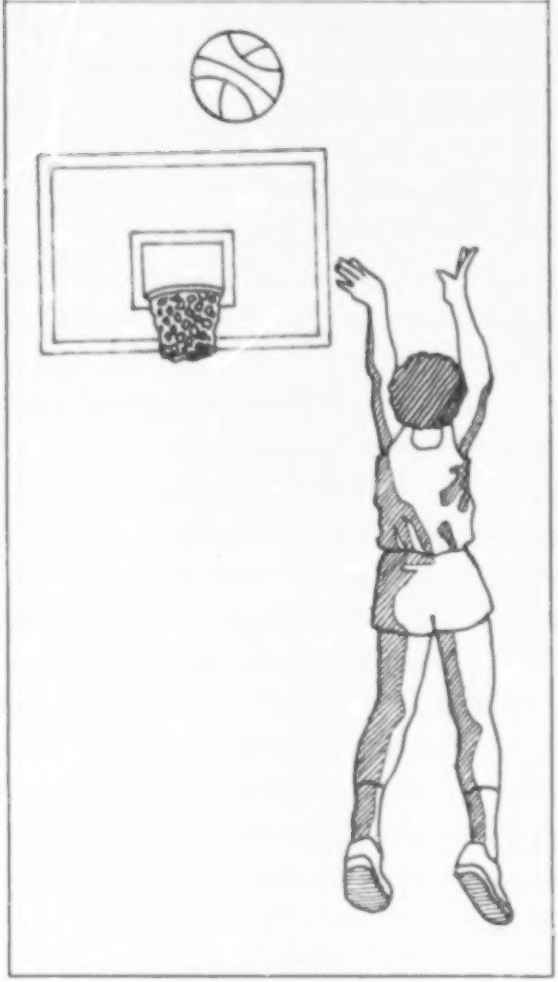
Reminders for the delayed jump shot technique include the following:

- Release the ball at the peak of the jump.
- Execute the jump within a 3-foot radius.
- Make sure to truly jump.

Rebounding

There are two basic rebounding situations: defensive and offensive. Both of these situations require timing and positioning. In addition, rebounding requires a mental toughness and aggressiveness. Rebounding does not demand tremendous jumping ability, but it does require anticipation, timing, and a sense of where the ball will go and where other players are on the court. Rebounds occur after a missed shot.

Figure 14. Delayed jump shot



The defensive rebound requires a "boxing out" procedure (Figure 15). Typically, the defensive player is positioned between the basket and the offensive player. When a shot is taken, the defensive player must either cross step or drop step in order to be positioned between the offensive player and the basket. The "box out" position is characterized by a wide base of support with the legs shoulder width apart and partially bent, the hips lowered, and the elbows wide with the arms generally parallel to the floor. The body is braced to absorb contact from the offensive player. The "box out" position is sustained until the defensive player anticipates the need to move to the ball to gain possession (i.e., release the "box out" position and go to the ball as it comes off the backboard or rim area).

The rebounder gains possession of the ball by timing the jump and gaining control at the highest point of the jump. The elbows and legs are spread wide with the buttocks extended to provide rebound room. The ball should be grasped with hands on both sides of the ball, or one hand on top and the other on the bottom. As the rebounder returns to the floor following the jump, a wide base should be maintained, and the ball should be positioned at the chest level with elbows out to protect the ball.

An offensive rebound requires that the offensive player "fight" around the "box out" of a defensive player in order to get in position to gain possession of the ball. The same technique for gaining possession of the ball is consistent with both an offensive and defensive rebound.

Techniques to remember regarding rebounding are as follows:

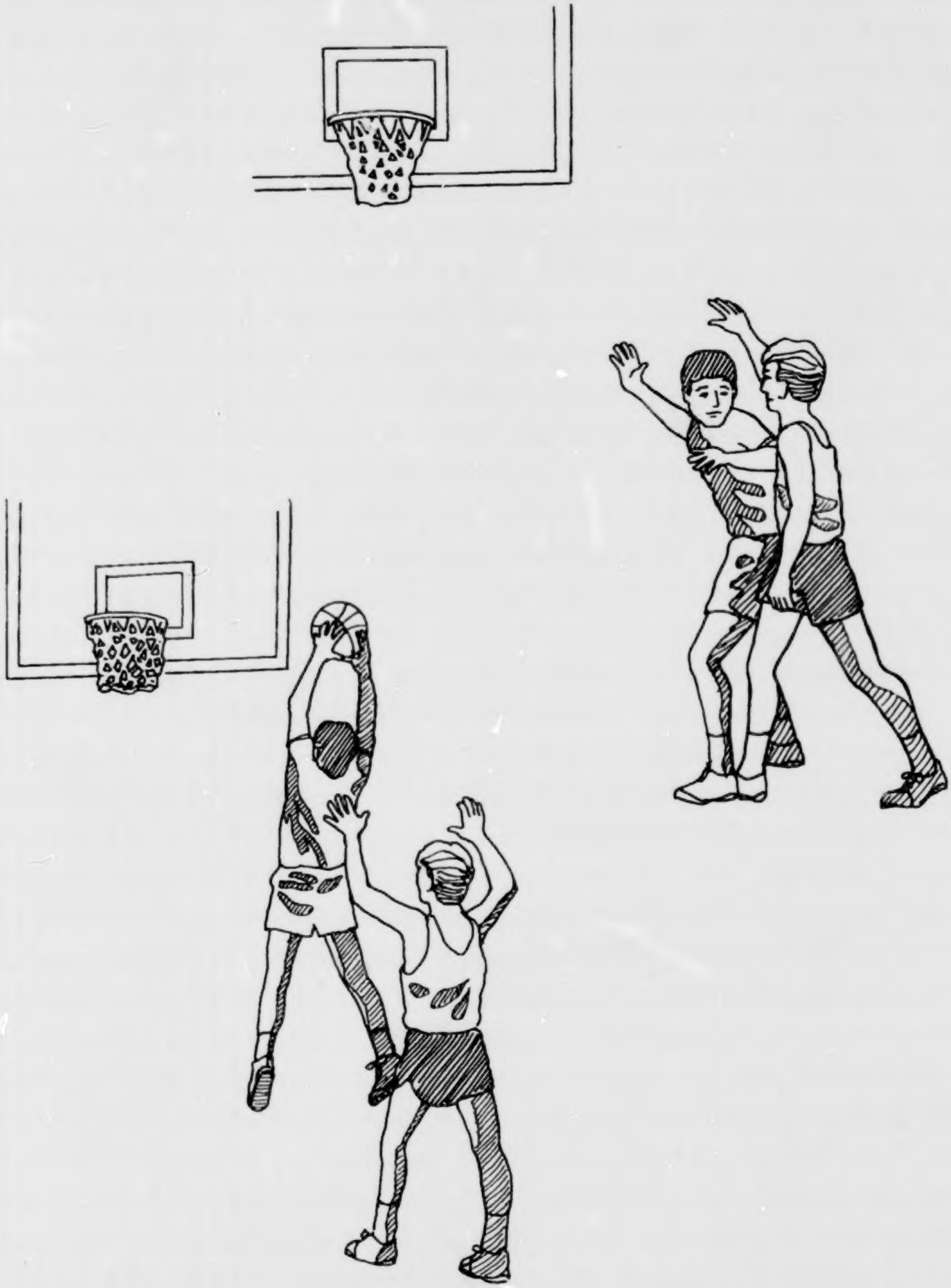
- "Box out" when on defense and sustain contact with the offensive player until it is time to jump and gain possession of the ball.
- Maintain a wide base when blocking out and jumping.
- Maintain a wide base with the elbows out when coming down with the rebound.
- Anticipate where the ball will carom off the backboard/rim and move to that area.
- The shooter has the best feel for where the ball is going and should be positioned to follow the shot.
- Offensive players should be deceptive in their movement to "fight" around the block out.
- It is not how high the rebounder jumps that is most important but rather the ability to be positioned for the rebound.

Defense

There are numerous team defenses that can be used in a game situation, but individual player defense is consistent. When playing one-on-one against another player, the basic principle of defense is for the defensive player to be positioned between the basket and the offensive player. When defending against a player in the low post (offensive player with back to the basket), a defensive player plays either to the side or in front of the offensive player.

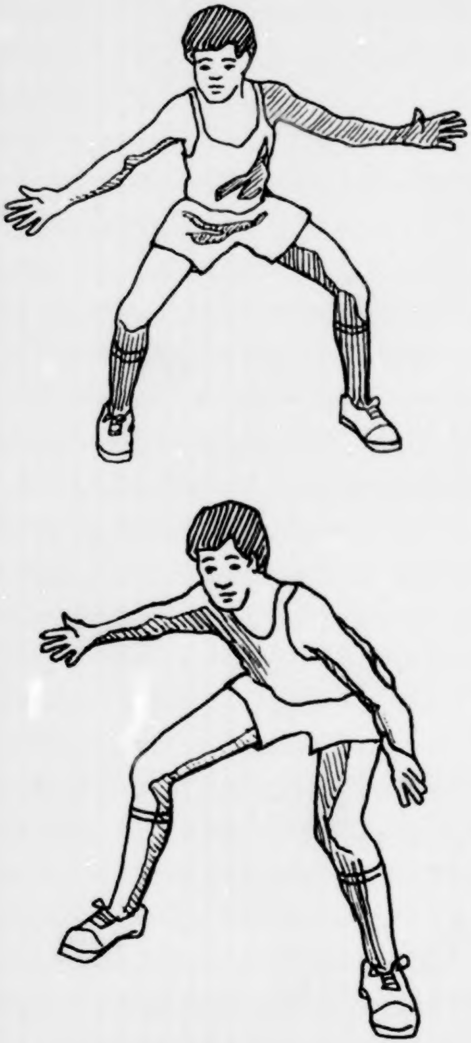
Perimeter one-on-one defensive play requires that the player establish a low center of gravity with the legs

Figure 15. Rebound sequence (box out)



bent and a shoulder-width base. The head and back are upright, and the defensive player slides or shuffles with the movement of the offensive player (Figure 16). If an offensive player moves to the defensive player's right side, the right foot of the defensive player drops and slides in that direction. When the offensive player changes directions to move to the defensive player's left side, the defensive player maintains the right foot position but drop steps with the left foot and begins to slide to the left. The key to perimeter defense is to give ground grudgingly and to never cross the feet.

Figure 16. Perimeter defense



Defending under the basket typically requires a side or front position (Figure 17). The idea is to deny the offensive player the ball. When "siding" an offensive player, a defensive player holds one arm in front of the offensive player and one behind. When "fronting" an offensive player, the defensive player attempts to maintain a frontal position with hands held high and a wide base to take up as much space as possible. Once the offensive player gains control of the ball in the post area, it is imperative that the defensive player return to a perimeter defensive stance behind the offensive player.

Reminders of defensive techniques include the following:

- Perimeter defensive player needs to stay low with a wide foot base.
- Perimeter defense requires a sliding action in timing with the offensive player.
- Perimeter defensive player must avoid crossing the feet.
- Perimeter defense requires keeping the hands active, with both arms out at the sides of the body or one up and one down.
- Offensive players under the basket must be denied the ball by siding or fronting the player.

Practice for Improvement

In order to improve, it is important to practice. Practice includes playing against others in half-court one-on-one, two-on-two, or three-on-three situations and full-court four-on-four or five-on-five situations. Individual practice should include shooting free throws (try shooting 100 per day and be amazed at the improvement), simulating situations when moving with and without the ball, and shooting from spots on the court that would also be appropriate shooting locations in a game situation.

A basketball player improves by putting in hours of practice each day and by making sure that the practice is quality practice that emphasizes fundamental skills. There are countless skill practice activities that can be used to improve performance. The practice activities presented below are representative of activities that are designed to improve skill.

Skill Activities

Dribbling Skill Activities

1. Dribble in a restricted area while changing speed and direction.

2. Set up obstacles (cones, chairs, etc.) and dribble through them.
3. Dribble in a one-on-one situation with a defensive player in a passive role.
4. Dribble in a one-on-one situation with a defensive player in an assertive role.
5. Play dribble tag with five to six players in a confined area.
6. Dribble blindfolded.

Passing and Receiving Skill Activities

1. Make a two-hand chest pass from a stationary position and then extend to a moving downcourt situation—concentrate on meeting the pass and giving with the force of the pass.
2. Pass to chest-high targets on the wall.
3. From a wing (free throw line extended), pass to a pivot player and then break to the corner for a return pass.
4. From a wing position, pass to a player in the corner and cut for the basket for a return pass.

Shooting Skill Activities

1. Drive to the basket from the side and execute a layup, alternating with left-hand layups from the left side and right-hand layups from the right side.
2. Start shooting layups close and progress back to shooting jump shots from increasing distances.
3. Identify a spot to shoot from and shoot 25 consecutive shots from that area. Concentrate on form (i.e., "goose neck" at release, release ball at top of jump, etc.).

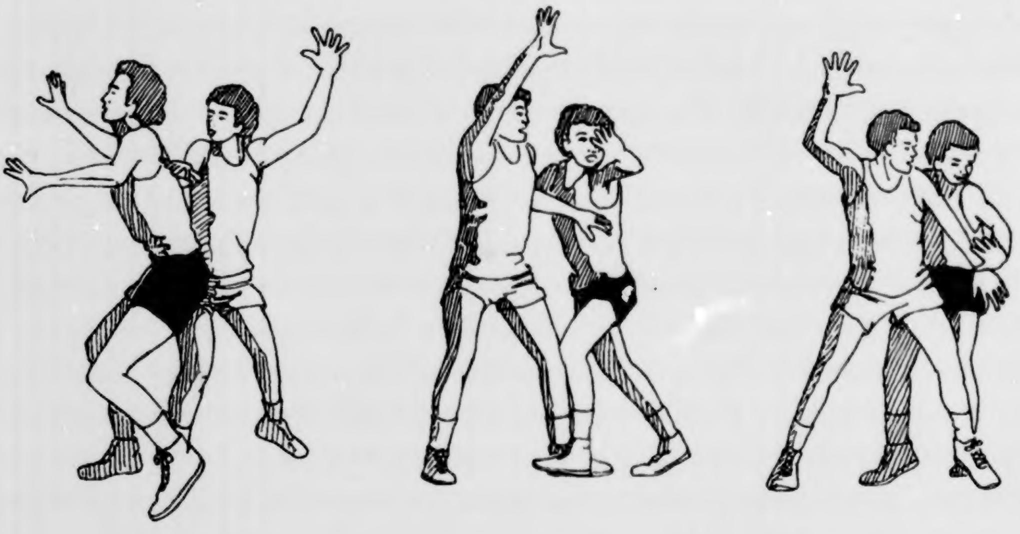
Rebounding Skill Activities

1. Stand in front of the backboard (or wall) and self toss the ball. Time the jump and rebound the ball with body wide, elbows out. Expand the activity to making an outlet pass to a partner.
2. Stand in front of the backboard and self toss the ball. Rebound the ball, and before landing on the court, put the ball back up on the backboard.
3. Work with another player and box out, trying to hold the box out for two seconds before releasing and moving to the basket, positioned to jump for the rebound.

Defensive Skill Activities

1. Play defense against a dribbler, sliding and drop stepping with the dribbler as the dribbler moves and changes directions. Increase the tempo and "attack" more aggressively without fouling.
2. Two players pass the ball with the defensive player in the middle. The defensive player defends against the player with the ball, and

Figure 17. Defending under the basket



when it is passed to the other player, the defensive player turns and moves to defend against the other passer.

3. Practice fronting and siding a pivot player while a partner tries to "feed" the pivot player from a wing position.

Self-Testing of Skills

Self-testing of skill is an important part of learning and can be challenging. Following are some examples of self-testing skill activities:

Dribbling

Dribble (moving left to right in sequence) through 10 cones set 3 feet apart and record the amount of time it takes.

Passing

Pass to a wall target positioned at varying heights and keep track within a time frame of the number of accurate passes.

Shooting

1. Shoot 25 free throws and record the number of made shots with a goal of 80%.
2. Make as many layups as possible in a 60-second time frame.
3. Set up five shooting spots (front of basket, each corner, and each wing). Shoot 10 shots from each spot with a goal of 50% accuracy.

Rebounding

Following a toss off the backboard, block out and then rebound the ball before it lands on the court surface. Record the number of successful rebounds in 10 tries.

Defense

1. Face an offensive player on the baseline and prohibit that player from driving the baseline. Record the number of successful defensive stops out of 10 tries.
2. Front or side a pivot player and record the number of times out of 10 pass attempts that the pivot player is denied the ball.

Safety Concerns

It is critical to be aware of safety in basketball. The reader should refer to the AAHPERD publication *Principles of Safety in Physical Education and Sport* for a complete breakdown of safety related to basketball. Following is a brief listing of safety factors.

Player safety concerns

1. Wear appropriate basketball shoes. Recommended features to look for when selecting a basketball shoe include the following:
   - A high top shoe.
   - A Y band (Fit Wrap Strap), which is a strap positioned around the ankle.
   - A heel counter.
   - A full midsole for shock absorption.
   - A wide base sole.
2. Use a mouth guard.
3. Use protective eyewear.
4. Be aware of other players' movements. Use peripheral vision to know where picks are set and learn to anticipate a player's change of direction.
5. Never "undercut" (e.g., forcefully foul a player when in midair) an opposing player.
6. Be fit enough to play the game.

Instructor safety concerns

1. Provide quality supervision of students.
2. Provide quality instruction and accurate information to students.
3. Establish buffer zones between teaching stations and play areas.
4. Insist on padding on the base of backboards.
5. Insist on padding on the walls behind the baskets.
6. Insist on breakaway rims.
7. Make sure floors are clean and slip-proof.
8. Eliminate all obstacles on the floor.

Competition

Playing Area

Playing court dimensions are different depending on the level of play. Typically, a high school basketball court is 50' x 84', with a junior high school/middle school court being slightly smaller but no less than 50' x 74'. However, basketball can be played on many surfaces and spaces, including blacktop playgrounds, gymnasiums, and even driveways with baskets attached to garages. A college floor increases in size to 50' x 94'. Various floor lines representing the mid court line, sidelines, baseline, free throw area, and three-point shooting arc are part of any floor configuration (Diagram 1).

Players

Basketball is, of course, played five against five, but depending on where the game is played, it can be played one against one, two against two, three against three, and four against four. Both males and females play the game, and other than in organized competition, coed games of basketball are commonly played.

Rules

The rules of basketball are extensive and should be studied in detail. The rules differ depending on the level of play (junior high school/middle school, high school, college, professional, or international). With all the rules variations, rules for a specific level should be reviewed directly from an official rulebook.

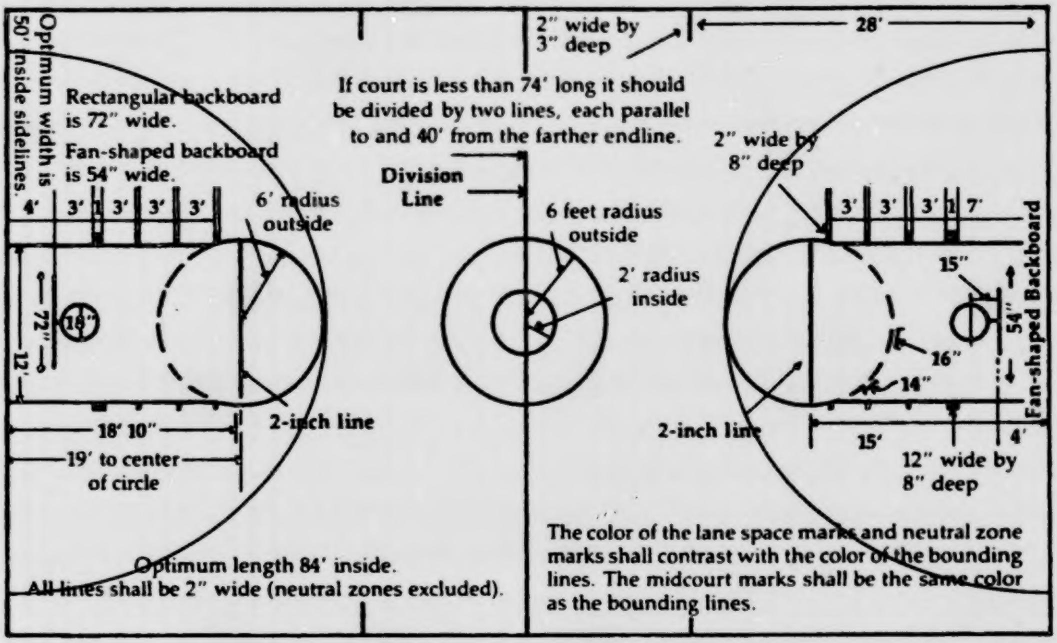
Scoring

Basketball scoring is easy. Each free throw is worth one point, a field goal is worth two points, and a shot from outside the arc is worth three points. Keeping individual and team statistics is an added experience that requires a scorebook and charts. The scorebook is used to keep track of points scored and fouls. Charts typically are used to record shots attempted and made, assists, rebounds, and steals. There are other forms of scoring depending on the type of game played. For example, a half-court game played on a playground may only count a basket as one point with a game to a pre-agreed score (e.g. 11, 15, or 21 points). Free throws are usually not shot in this type of "pickup" game.

Tactics

There are countless game situations and strategies related to basketball. It is important to remember that, although the game is a five-against-five team game, it is actually structured for one-against-one, two-against-two, or three-against-three situations. Other than a pattern offense where all team members have a spot to move to offensively, seldom does the game involve five against five at one specific time.

Diagram 1. Regulation secondary school basketball court


Optimum width is 50' inside sidelines.
2" wide by 3" deep
28'
Rectangular backboard is 72" wide.
Fan-shaped backboard is 54" wide.
4'
3'
1
3'
3'
3'
6' radius outside
Division Line
6 feet radius outside
2' radius inside
2" wide by 8" deep
3'
3'
3'
1
7'
15"
54"
Fan-shaped Backboard
16"
14"
72"
18"
12'
2-inch line
18' 10"
19' to center of circle
2-inch line
15'
4'
12" wide by 8" deep

If court is less than 74' long it should be divided by two lines, each parallel to and 40' from the farther endline.

The color of the lane space marks and neutral zone marks shall contrast with the color of the bounding lines. The midcourt marks shall be the same color as the bounding lines.

Optimum length 84' inside.
All lines shall be 2" wide (neutral zones excluded).

Left end shows large backboard.

Minimum of 3 Feet
Preferably 10' of unobstructed space outside. If impossible to provide 3 feet, a narrow broken 1" line should be marked inside the court parallel with and 3' inside the boundary.

Semicircle Broken Lines
For the broken line semicircle in the free throw lane, it is recommended there be 8 marks 16" long and 7 spaces 14" long.

Right end shows small backboard.

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Strategies are multifaceted. There are strategies for an offensive team depending on the talent of the opposing team, the score, and the time left in a game. Defensive strategies exist to confuse the offense. A press places pressure on the offense. A player-to-player defense matches skills of individual players. A zone defense forces an offense to adjust to a player defending a zone of the court, thus causing the offense to move the ball differently than they would against a player-to-player defense.

Strategy is associated with various offensive and defensive sets. Offensively, there are numerous pattern offenses, freelance offenses, offenses against zone defenses, and fast break or transition offenses. Defensive situations include player-to-player defense with variations of sagging, switching, and pressure; zones including 1-3-1, 2-3, 1-2-2, 2-1-2, and 3-2; and full- and half-court presses that are both player-to-player and zone.

Pattern offenses are numerous. They include patterns like the "triangle," "shuffle," and "passing game." Most patterns may be too complicated for a class situation, but freelance offenses (without a pattern) are not. This offense allows for freedom of expression and both individual and team play opportunities. Freelance offenses typically include position names with a point guard, shooting guard, weak side forward, strong side forward, and center. Even with a freelance offense, there are rules to follow that protect the integrity of the offense. These rules include the following:

- Maintain floor balance with two players on any one side of the court at one time.
- Passing the ball requires that the passer has to then make a move to an open spot or set a "pick" for a teammate.
- As players move, there has to always be a "back" player for defensive purposes.
- Dribbling should be limited and passing encouraged.
- If a player drives to the basket, teammates should look for a pass.

Offenses against a zone are similar to pattern offenses, but simple rules can make attacking a zone defense easier. These rules include the folowing:

- If the zone has two players out front (e.g., 2-1-2 zone) the offense should balance the court with only one player out front (e.g., 1-3-1 offensive set). If confronting a zone with one player out front (e.g., 1-2-2), balance the court with two offensive players out front.
- Pass around the perimeter to move the defense and open up a shot opportunity.
- Split "seams" in the zone and then pass outside for the shot (i.e., one player drives between two defensive players, forcing a double team situation, which then creates a pass to an open teammate).
- Keep moving and cutting.
- Pass instead of dribbling.

The fast break (transition) offense requires converting an opposing team's mistake or a made basket into a quick and planned offensive strike. The basic premise of the transition from defense to an offensive attack is to do the following:

- Make an outlet pass.
- Fill three lanes on the break
- Complete the break with the middle player stopping at the free throw line and either shooting the ball or passing to a teammate on either side lane for a layup.

There are other forms of transition play, including one player releasing early in order to receive a length-of-floor pass for a layup, or passing to a "trailer" player (the fourth player down the floor) for a layup or short jump shot during the three-player controlled break. Fast break or transition play is one of the most exciting and fun things to do in basketball, and, when done correctly, can be a great offensive attack.

Player-to-player defenses are the basis for all defenses. This is an individual-against-individual defense blended into a team effort. In order to play a player-to-player defense, there are specific team rules to follow:

- Follow individual defensive fundamentals.
- Never let an offensive player drive the baseline.
- Always keep a hand up when a player shoots the ball.
- Help out from the weak side.
- Talk to teammates, warning of picks, etc.

Zone defenses are played with each member of the team defending a specific area of the court against the offensive player in control of the ball. The following zone defense rules apply:

- All players within a zone defense configuration should defend with their hands up.
- The zone must attempt to maintain form against a perimeter passing effort.
- Weak side defensive help is critical underneath the basket.
- When an offensive player enters a zone area, the defensive player uses player-to-player skills.
- Once an offensive player leaves a zone defended by the individual defensive player, the defensive player stays in the assigned zone.

There are numerous types of presses executed as half-court, three-quarter court, and full court. These presses can be player-to-player and zone. Zone presses are labeled as 3-1-1, 2-1-2, 1-2-2, and 1-3-1 presses. The basic premise of any press is to apply pressure to force an offensive error. This is accomplished by double-teaming a player with the ball, forcing long passes, and moving the offense in a direction that they don't want to go.

Resources for Continued Participation

Basketball is a game that can be played from a very early age through adulthood. There are pee wee basketball games beginning at around age 5 or 6, and senior leagues for adults in their 60s and 70s. Even as skills deteriorate with lack of practice and an increase in physical limitations, it is still fun to go out in the driveway or to a playground and shoot baskets. There are intramural basketball leagues available in many secondary schools, and there are numerous intramural basketball leagues at the college level. Cities sponsor three-on-three basketball tournament competitions, and adult basketball recreation leagues are found in nearly every town or city. And the most delightful thing about the game is that on any afternoon or evening, there are pickup games found on countless playgrounds throughout the country.

There are also numerous videos and books on basketball to enhance skill development and knowledge of the game. The Internet is also available to access information by using code words (e.g., basketball, basketball skill, basketball instruction, etc.). Following are a few selected books for more information:

Bryant, J. E. (2002). *Basketball.* In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education.* Reston, VA: National Association for Sport and Physical Education.

*Goldstein, S. (1995). *The basketball player's Bible: A comprehensive and systematic guide to playing.* Philadelphia: Golden Aura Publishing.

Mikes, J. (1991). *Basketball fundamentals: A complete mental training guide.* Champaign, IL: Human Kinetics Publishing Company.

Scott, J. W. (1985). *Step-by-step basketball fundamentals for the player and coach.* Boston: Allyn and Bacon.

St. Martin, T., & Frangie, F. (1992). *The art of shooting baskets: From the free throw line to the slam dunk.* Lincolnwood, IL: NTC Contemporary Publishers.

* Sidney Goldstein has written numerous instructional books as a series entitled the *Nitty Gritty Basketball Series.* This series includes books on dribbling, passing, cutting and moving, conditioning, shooting, etc.

CHAPTER 7

Climbing and Challenge Course

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Introduction

Adventure programs such as rock climbing, bouldering (unroped climbing), and "ropes" or "challenge" courses can be challenging, intimidating, thrilling, and fun. The perceived danger and fear derived from many of these activities are often the result of the height at which they take place. Participants will and do fall. But they shouldn't fall to the ground or get hurt in the process. Because adventure courses are so diverse and feature varying elements and activities, the focus of this chapter will be on the more generalized skills and equipment associated with "spotting" and "belaying."

The information in this chapter is intended to be an introduction and guide and should not take the place of competent and professional instruction. The information presented should be used as a supplement, not an instruction manual. *If you misunderstand a concept or skill in this chapter, you could be seriously injured or even killed.*

Terminology

Challenge Courses

Challenge or "ropes" courses are comprised of individual and group activities that typically involve a degree of physicality and problem solving and allow individuals to venture past their comfort zone in a safe, positive, and fun environment. Activities or "elements" are constructed of wood, cables, tires, and ropes and are connected outdoors to trees or telephone poles and indoors to steel and wood girders.

Group initiative courses (low ropes) offer a hands-on approach to leadership skills, group interaction, and teamwork. A group may be asked to swing across an imaginary canyon, pass through a giant spider's web, or blindly navigate a three-dimensional minefield. The group's response to each challenge often reveals insights into their ability to work together, communicate, and creatively solve problems. By discussing what occurred during and after these activities, students can draw analogies and develop strategies for real-life situations and problems.

The confidence course (high ropes) presents a unique and often intimidating experience. Students might be asked to step off a platform 50 feet above the ground or soar 200 feet on a pulley system down a steel cable. Trained staff instruct and guide individuals as they weave their way through ropes, swings, cables, and catwalks high above the ground. After developing the courage to overcome the challenge, participants often come away with a natural high and increased self-confidence.

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Climbing

Conventional outdoor rock climbing includes climbing rock faces, ice, desert towers, arêtes, cracks, chimneys, and ledges in a top-rope, lead, or sport climb setup. Top-roping consists of a rope tied to a climber that is fed up through an anchor at the top of the rock face and fed down to a "belayer" or braker on the other end of the rope.

Lead climbing is a more advanced form of climbing, with no set anchor from above. Climbers set up and place anchors (also called "protection") as they ascend a route and clip the rope into their protection as they climb. A belayer still remains at the other end of the rope in the event of a fall. When a climber in a lead situation falls, he or she falls to the distance of the last anchor plus the same distance past the anchor.

Sport climbing is climbing on routes with pre-drilled steel bolts that climbers can clip into as they move up a rock face. This allows climbers to climb with less risk and gear than in a lead climb situation.

"Rock" climbing has expanded in recent years with the introduction of hundreds of indoor climbing facilities. Indoor facilities are made from plywood, metal, and fiberglass and have moveable handholds that allow owners to change and create new routes on a regular basis. Indoor climbing is extremely safe, provides a great place to meet fellow climbers, and provides a good workout and practice area for outdoor climbing.

A classification system, called the Yosemite Decimal system, was invented in the 1950s to describe the difficulty of any climb. Most recreational climbing falls into the Class 5 category, which means that a rope and specialized equipment is required. Class 5 climbs are further broken down from the easiest climbs at 5.0 to the most difficult climbs at 5.14. Most recognized outdoor climbing routes and many indoor routes are classified with this popular system.

Equipment

There are many types and brands of equipment utilized for adventure activities. Gear designed to bear weight or support participants must be carefully selected, maintained, inspected, stored, and used according to manufacturers' instructions.

Clothing

Because climates and conditions for adventure activities differ so greatly, participants should dress in layers so that they can adapt to any changes in weather. Footwear should be chosen for both the activity and the terrain. High heels and sandals are not appropriate footwear for most adventure activities. If the activity requires belaying, a tough pair of leather gloves will save some wear and tear on the hands.

Helmets

Helmets are typically worn by participants while on and in the vicinity of a "high ropes" course and while climbing. Aside from protection from falling debris and branches, helmets protect participants from bumping their heads into branches, wires, handholds, and equipment as they climb and traverse activities. Helmets identified as meeting the Union of International Alpine Association (UIAA) standards are the most common types used for adventure activities. Helmets, like other gear, should be properly fitted to the participant so that there is no wobble front to back or side to side. A four-point chinstrap and method of venting to prevent heat buildup are other desirable features.

Harnesses

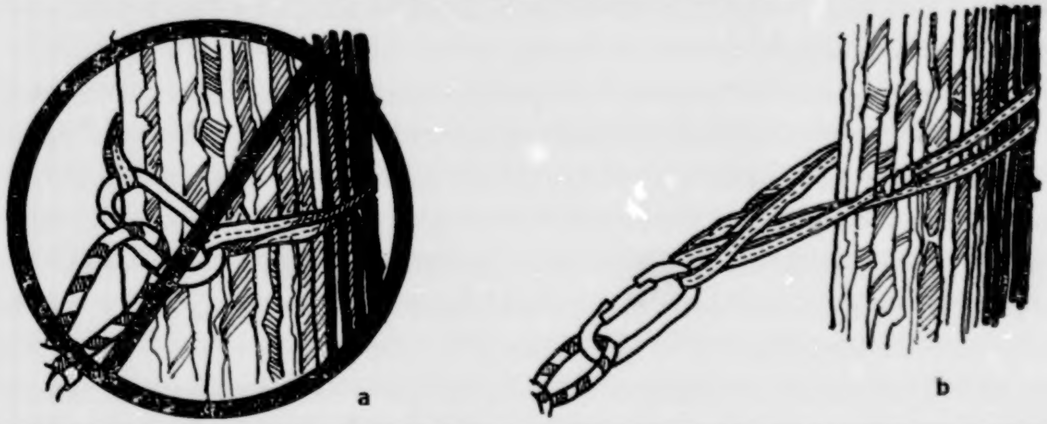
A harness is a rope or straplike device that serves to connect other equipment to the body. It is possible to wrap and secure webbing and rope around participants' legs and waist to provide them with a safe and secure attachment point. Commercially sewn harnesses, however, are generally more comfortable and easier to use. Most commercial harnesses meet minimum standards for strength and construction and are designed to fit different body types. Make sure all manufacturers' directions and procedures are followed because adjustments and buckling differ from harness to harness and affect both fit and function. Always double-check your harness setup before you leave the ground.

Carabiners

A carabiner, also known as a biner (bean-er), is an oval-shaped aluminum alloy or steel link with a spring-loaded gate in one side that connects various pieces of the climbing chain. Impact, especially from a high ropes or climbing height, can damage a carabiner internally and weaken it. Dropped carabiners should be retired. Visual inspection does not always reveal damage.

Carabiners are designed to be weighted lengthwise (Figure 1). Never stress a carabiner so there is a pressure pulling straight out on the gate. This could reduce the breaking strength from 5,000 pounds to 500 pounds.

Figure 1. Carabiner: (a) incorrectly cross-loaded carabiner, (b) correctly cross-loaded carabiner



Rope

Ropes serve as the lifeline between participant and belayer. There are many compositions and diameters that are used in ropes course and climbing settings, and minimum standards are set by UIAA and CEN (European standard). Be sure to check manufacturers' ratings and recommended usage, care, and approximate lifetime before utilizing them. To get the most life out of a rope, use the following precautions and suggestions:

- Do not step on a rope. Stepping can grind grit into a rope that can work its way through the outer sheath and into the inner core, causing it to wear prematurely.
- Keep ropes out of direct sunlight whenever possible. Ultraviolet radiation can deteriorate nylon.
- Loosely coil, gather, bundle, or bag rope for storage and transportation.
- Allow the rope to rest between falls.

All ropes course belay and weight-bearing ropes should undergo a thorough inspection prior to use. Participants should run the length of the rope through their hands and fingers and look and feel for the following:

- Soft or hard areas
- Stiffness
- "Fuzzing" or "puffing"
- Cuts, kinks, or other damage
- Variations in thickness

Table 1. Sample Breaking Strengths of Adventure Course Components

Participants often inquire as to the strength of the different gear they will be relying on while "dangling" high above the ground. An instructor who doesn't have a general idea of equipment strengths doesn't exactly instill a sense of confidence in the student.

The following statistics are approximations only and come mostly from manufacturers' technical information. Differences will exist between various compositions, diameters, and designs.

GEAR	APPROXIMATE BREAKING STRENGTH (in pounds)
Carabiners	
Aluminum carabiners 11mm	5,000-6,000
Autolocking carabiners 12mm	5,000-6,000
Steel carabiner 12mm	6,000-8,000
Aircraft Cable	
7 x 19 class 5/16" galvanized cable	9,800
7 x 19 class 3/8" galvanized cable	14,400
Webbing	
1" tubular webbing	4,000
1" flat webbing	6,000
2" tubular webbing	7,000
Rope and Cord	
11mm dynamic rope	5,000-6,000
KM III static 7/16" kernmantle rope	10,000
KM III static 1/2" kernmantle rope	10,000
5.5 mm spectra cord	4,000-5,000
Miscellaneous	
Sewn harness	4,000-5,000
Pulleys	7,000-9,000
Figure 8 rescue device	12,000

Any rope found to have one or more of these conditions should be retired and labeled or discarded accordingly.

Breaking strength illustrations for carabiners, ropes, and other weight-bearing equipment are presented in Table 1.

Spotting

Falling from a moderate height (below six feet) is a reasonable expectation in adventure programs. Correct spotting techniques will minimize injuries that can result from such a fall. Spotting is usually taught in simple introductory activities so participants become comfortable supporting and trusting one another before moving to more complex situations. Spotting techniques and the number of spotters are unique for each activity.

Belaying

Adventure programs sometimes promote a perceived risk by adding an element of height. Activities that are too high to be safely spotted from the ground require a safety system referred to as a belay. It is essentially a lifeline between two individuals, and its function is to reduce the possibility of injury in the event of a fall and to provide psychological reassurance to the participant. The basic system uses rope, carabiners, a harness, and other hardware specific to the activity.

Static or self-belays use a short length of rope or webbing that is connected from an anchored point to the participant's harness. This type of belay is effective in allowing several participants on a high course at one time under the close supervision and precise instructions of one instructor.

Dynamic belays involve a participant with a belayer on the ground. Rope is taken in or let out according to the movements of the participant. In the event of a fall, the belayer can control the rope, prevent a fall, and lower the participant in a slow and gradual descent. A dynamic belay tends to put less strain on individuals and gear than static belays due to the built-in stretch of the rope.

There is a third belay technique sometimes used in adventure programs called an Australian or group belay. Several members securely attach themselves to the belayer's end of the rope, and as the climber climbs, the team of belayers back up, reducing slack in the rope. If the climber falls, the combined weight of the belayers prevents the fall. The belay team simply walks forward to lower the participant to the ground.

Fitness Requirements

Adventure activities that involve climbing require a reasonable degree of strength, flexibility, and physical endurance. Contrary to popular myth, strong arms and back muscles are not prerequisites for good climbing ability. Much of climbing can be accomplished with good technique and utilizing leg muscles more than upper body muscles. The method is not much different than climbing a ladder or a set of stairs. Hands and arms maintain balance while legs do most of the work.

Although high strength and low body weight are assets, they are not essential. If an individual can climb stairs or a ladder, they should have the fitness required to do simple low-angle climbing. When first starting, keep in mind that participants will probably tire quickly and have slightly sore forearms until they get used to the activity. With additional strength training and cardiovascular exercise, they can increase their stamina and endurance.

Skills

Spotting

Spotting can be utilized for low team building activities as well as bouldering along a climbing wall or an outdoor rock face. The purpose of spotting is simple. It is a way to soften a fall and/or provide a safety net for individuals participating in an activity and to protect and support their head and upper body in the event of a fall. It is not designed to literally catch a falling body but merely to slow the descent to the ground. Although the spotter and/or the participant may both wind up on the ground, it does not necessarily mean that the spotter has not performed his or her function. Falls do occur, and minor abrasions and bruises are unfortunate but realistic occurrences.

The following are some suggestions and guidelines for effective spotting:

1. Spotters should stand balanced and centered, with their knees flexed to absorb impact and their hands up, elbows bent, and fingers together, reaching toward the participant.
2. Spotters should keep a close eye on participants and try to anticipate the potential fall. They should make adjustments in their stance and

reposition themselves to better and more quickly respond.

3. Spotters should move with participants as they traverse an activity or element and attempt to avoid crossing their feet (so as not to trip over themselves).
4. Spotters should try to absorb force, not stop it. Giving with the body through the use of bent arms and knees and rolling in the direction of the force will provide a cushion for the fall.
5. This is serious business, and injury can take place as a result of poor spotting technique. This is not the time for joking about not catching someone.
6. Factors such as height, weight, size, and potential fall distance will necessitate adjustments in the number of spotters.
7. Spotters should be prepared for forward and backward falls.
8. Spotters and participants should talk with one another to communicate readiness and their current state. Phrases such as "ready to fall," "spotters ready," "falling," and "fall away" are effective tools in promoting confidence for the participant and ensuring attention, focus, and readiness for spotters.

NOTE: Spotting does not mean assisting or helping an individual with an activity. Participants should be allowed to succeed or fail on their own!

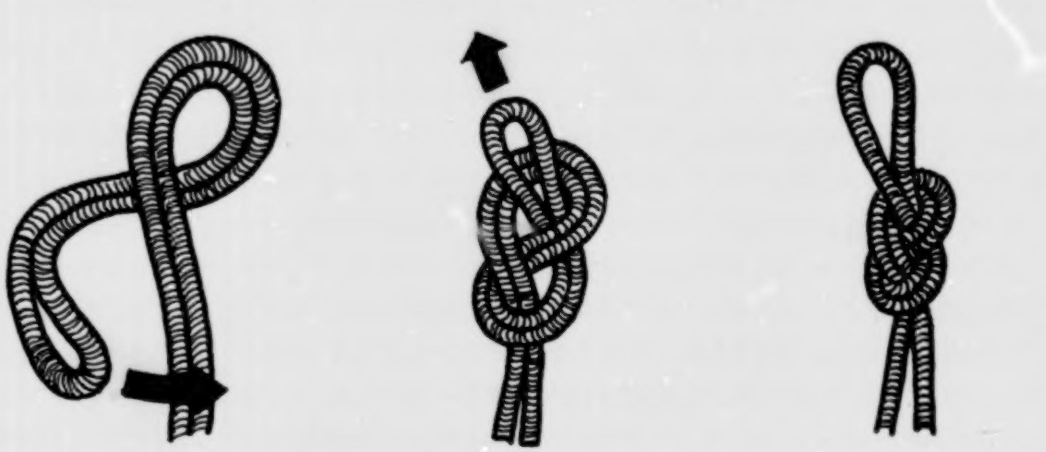
There are some adventure activities such as "the wall" that require lifting and elevation of participants for successful completion of the element. No more than three levels of participants should be stacked vertically at any one time. Good hoisting technique includes standing with backs straight, knees locked, fingers interlocked, and arms straight to minimize back strain and injury. Under no circumstances should anyone step on the middle of a lifter's back. Individuals with a bad or injured back, elbow, or knee should find nonweight-bearing roles for these type activities.

Knots

Knots are used in adventure courses and climbing walls to connect people to ropes and to anchor systems (the ground). Tying knots is a critical skill for belaying and climbing. A well-tied knot should be neatly "dressed," have no extraneous twists, and be easy to inspect. As a general rule, the more bends that take place in a knot, the weaker it becomes. Rope is strongest when oriented in a straight line.

There are a many knots that are acceptable and suitable for connecting the end of the rope to a harness (Figure 2). The follow-through figure eight (sometimes

Figure 2. Figure Eight on a Bight

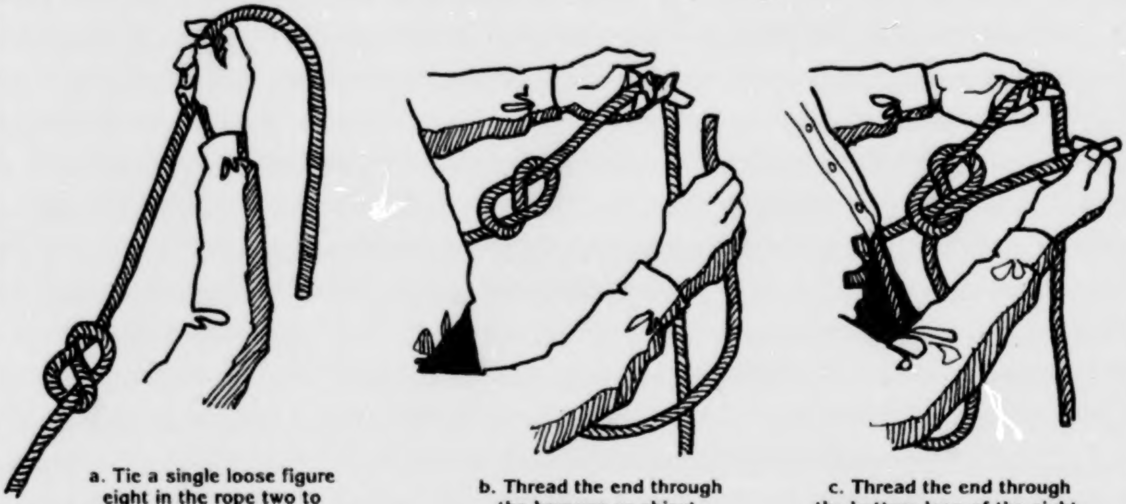


a. Create a loop in the rope and pass under the main rope.

b. Pass the end over the main rope and through the loop.

c. Pull loop and opposite ends to tighten and flatten the rope.

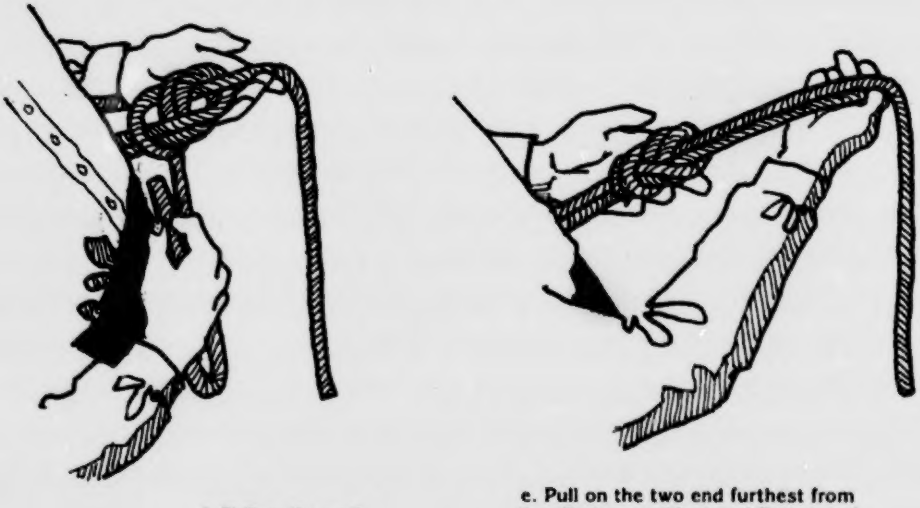
Figure 3. Follow Through Figure Eight Knot



a. Tie a single loose figure eight in the rope two to three feet from its end.

b. Thread the end through the harness or object.

c. Thread the end through the bottom loop of the eight.



d. Follow the path of the existing eight.

e. Pull on the two end furthest from the climber or object and flatten and dress the knot as shown.

Table 2. Knot Strength

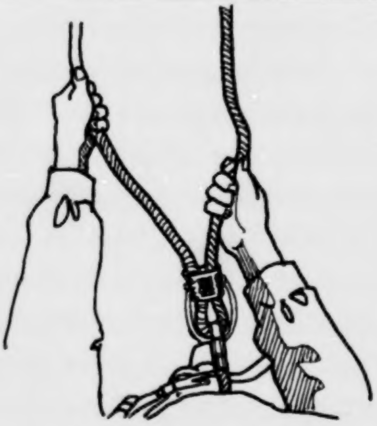
Knot	Relative Strength
No Knot	100%
Figure Eight	70-75%
Double Bowline	70-75%
Double Fisherman's	65-70%
Water Knot	60-70%
Overhand Knot	60-65%
Clove Hitch	60-65%
Square Knot	45%

called the threaded figure eight) has become the standard for both indoor and outdoor courses and walls (Figure 3). It also happens to be one of the strongest (see Table 2) and becomes tighter as the result of pulling harder or applying additional force. Like all knots, the figure eight follow-through should be double-checked before engaging in an activity.

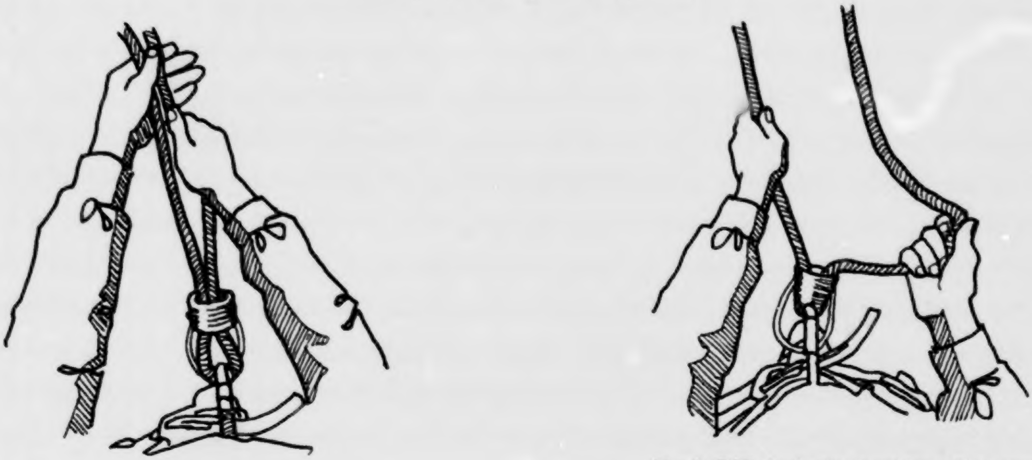
Belaying

Dynamic belays are controlled by a system of friction where the rope is slowed or stopped through the actions of the belayer (Figure 4). It is possible, if properly taught, to use one's body and gloved hands

Figure 4. Belaying



a. Reach up with the climber end hand and with both hands grasping the rope, pull out the slack by feeding rope through the belay device.



b. When the climbing end hand reaches the braking hand, clasp both ends of the rope and slide the brake hand down to the belay device.

c. "Lock Off" the brake hand by pulling away and toward the ground. Hands should be in this brake position at all times unless there is slack or movement by the climber.

as a method of braking. However, a body belay has potential to produce rope burns, muscle strain, and smoking gloves. The alternative is to use a mechanical device such as a Figure 8, a sticht plate, a munter hitch, or a self-arresting belay device.

Here are some suggested guidelines for belaying:

1. Only well-trained, competent, and tested belayers should belay.
2. Before allowing the participant or climber to move, the belayer should check to make sure the harness is worn correctly, appropriate knots are tied, and carabiner gates are locked and in the down position.
3. Under no circumstances should the braking hand of the belayer ever be removed from the climbing rope until the participant is safely on the ground and off belay.
4. Full attention should be kept on the climber at all times. The belayer should not take his/her eyes off the participant.
5. Belayers should keep up with the movements of the participant. There should not be excess slack on a rope. If a participant is moving too fast, the belayer should tell him or her to stop or slow down.
6. Belayers should be securely anchored so they do not become airborne during a fall or descent.
7. Belayers should stay aligned with a laterally moving participant. They should stand as close to an element (without standing directly underneath it) as conditions permit.
8. Belayers should communicate with the participant at all times.
9. Belayers should seek the assistance of another belayer to back them up.
10. No one should walk between the belayer and the climber.

Climbing Signals

Communication is essential to belay and climbing safety. The following are some common phrases and terms that should be used at all times to prevent confusion and mishaps.

"On belay?"
The climber asks this question to the belayer. At this point, the climber and belayer should check themselves and one another to insure the following:

1. They are both on the same rope (as silly as it sounds, it does happen).
2. The climber is on the correct rope end for a particular climb.
3. Buckles are doubled back as required.
4. Knots are tied correctly.
5. The belay device and anchor are set up properly, and the carabiner is locked.

"Belay on"
Statement from the belayer to inform the climber that the belay system is set up correctly. The belayer should remove any slack from the system at this time.

"Climbing"
Announcement by the climber that he/she wishes to commence the climb.

"Climb on"
The climber should not leave the ground until he/she hears this signal from the belayer. Although the belay system may be set up and ready, the belayer may not leave the ground unless this command is heard.

"Slack"
A signal from the climber indicating to the belayer that the line is too tight and that they require some extra rope. A belay that is overly tight can pull the climber off balance.

"Up rope"
A command from the climber indicating that there is too much slack in the system. The belayer should take up the slack in the rope.

"Falling"
The climber may or may not have the time to say this. The belayer should lock off the brake immediately in preparation for the fall.

"Take" or "Tension"
A signal to the belayer that the climber is going to let go or fall. The belayer should quickly take up all the slack in the system and wait on brake for the climber to weight the rope.

"Got" or "Gotcha"
The belayer's response to "Take," indicating that the belayer has taken up as much slack as he/she can and is waiting with the brake locked off. The climber can let go and weight the rope.

"Off belay"
The climber has been lowered to the ground. The climber's signal to the belayer that the belayer is no longer responsible for belaying the climber.

"Belay off"
The belayer's acknowledgement that he/she is no longer responsible for belaying the climber.

Climbing Skills

Although climbing is fairly instinctive, there are some basic principles and "moves" that can make individuals more efficient and successful in completing a climb. Working out moves on the ground and climbing with your eyes and brain will prevent unnecessary movement. The objective of any climb should be to move smoothly and safely from hold to hold while using as little energy as possible.

Here are a few basic principles:

1. Try to work out where your hands and feet will go several moves ahead.
2. Don't move your feet until you know where they are going.
3. Use your more powerful leg muscles to push your body up.
4. Try to use handholds for balance only.
5. Try to keep three points of contact on the rock and move one limb at a time.
6. Look all around for handholds and footholds. Look down and to the side as often as you look up.
7. Arrange your legs and feet so that your arms are not bent and bearing the full weight of your body.
8. Deliberately, smoothly, and accurately place your feet. It is most often better to use the inside edge of your foot for toeholds
9. Stand up straight when possible to keep your body weight over your feet.
10. Find places to rest so that blood and strength can return to your arms.

Here are a few basic moves:

Layback: A layback is a classic climbing move where the climber turns somewhat sideways to the wall and leans back while gripping the edge of a rock with one or both hands. At the same time, the legs push and extend while the arms pull.

Mantle: A mantle is a move used to climb up and over a ledge, bulge, or overhang. It begins by reaching and holding on to the ledge with both hands, leaning back slightly, pushing up with the feet, and pulling the hands up smoothly and quickly. At a point where the waist comes even with the ledge, the hands should transition from a pull to a downward push, and one or both feet can rise up to the ledge. The movement is similar to that of jumping over a fence.

Heel hook: A heel hook is an attempt to use the foot as a hand. The basic movement consists of placing or swinging the heel of a shoe over or behind a hold (often over the climber's head), and pulling with the foot until one of the climber's hands can reach the hold.

Bridging: A bridge can offer a means of rest during a difficult climb. It is achieved by keeping your arms and legs apart (as in a Russian split) and using outward force to keep the body in balance.

Dyno: A "dyno," or dynamic move, is essentially a jump or lunge to attain a hold that cannot be attained by reaching. The climber vaults up or sideways and attempts to grab a new hold while at the apex of the leap. It is aided by an explosive pull from the arms and a kick off from the footholds.

Practice for Improvement

Spotting, knot tying, and belaying are skills that must be practiced until they become second nature. Spotting can be practiced through very low-height, leader-led trust activities such as trust falls and "willow in the wind." Pairing individuals of similar size and using multiple spotters are smart safety considerations.

Belaying technique can be practiced on the ground with someone applying random force (by pulling on the rope) to simulate a climber's fall. This can lead into low-height fall simulations, (six feet or so), so the belayer can feel the weight and pull of the climber on the rope and get accustomed to trusting and using the mechanical function of the braking device.

Knots can and should be tied repeatedly until they are mastered. Individuals can compete to see who can tie their knots the fastest or who can tie the "best-looking" knot. Knots should look as well dressed and neat as they do in the Figures 2 and 3.

Upon completion of practice, belayers should be able to demonstrate the following:

1. Ability to properly buckle and fit into a harness.
2. Ability to tie a follow-through figure eight knot.
3. Ability to connect to an anchor.
4. Use of proper belay and climbing signals.

5. Belay with correct form, which includes keeping the brake hand on the rope at all times.
6. Lower a climber to the ground in a slow, controlled descent.

Safety Concerns

Serious injury and death can occur as a result of improper supervision and instruction. Adventure activities require special training by qualified instructors. Participants in adventure activities should do so only under the direction and guidance of trained professionals.

Participants should know and understand the objectives, safety procedures, and hazards of each activity. Unsafe actions such as hanging upside down, diving, jumping, throwing people or objects, or overexerting should be avoided. Objects in pockets or around necks and fingers, such as earrings and rings, must be removed. Eyeglasses should be secured.

Many activities require individuals to go beyond their comfort zone. The responsibility and the ultimate choice as to whether to participate lies with the individual. Participants must take responsibility for their own actions and recognize to some degree their own limitations. Following a thorough explanation, description, and/or demonstration of an element, individuals have to decide for themselves whether they are comfortable participating in any given activity. If they are not comfortable for whatever reason (medical, psychological, etc.), they should inform their partner, the group, or the instructor that they choose not to participate. Other roles such as scoring, coaching, timing, or cheering are acceptable alternatives.

Outdoor adventure programs typically run in a variety of weather conditions, including snow, rain, extreme heat, and ice. If conditions are deemed poor and there is a significant risk of slippage (especially with belaying in the high ropes arena) due to rain or ice, activities should be postponed or brought inside, if feasible. Participants should prepare for inclement weather.

One of the most dangerous and frequently encountered weather hazards in adventure programs is lightning. Approximately 100,000 thunderstorms occur in the United Sates each year, resulting in an average of 750 injuries and 200 deaths. Blue skies and the absence of rain are not an assurance that lightning will not strike. Lightning can travel up to 10 miles from cloud to ground. The area and composition of most adventure courses (i.e., trees, steel cables, metal hardware) is not the place to be when lightning strikes.

A good method for approximating the distance of lightning is the "flash/bang" technique. Every count of five from the time of seeing the lightning stroke to hearing the associated thunder indicates that lightning is one mile away. A "flash/bang" count of 10 seconds represents two miles; a "flash/bang" count of 30 seconds represents six miles. If possible, err on the safe side and suspend all activity when you first hear thunder. Do not resume outdoor activities until 20 minutes have passed from the last observable thunder or lightning.

The National Lightning Safety Institute provides the following recommendations:

- If possible, get indoors or inside a car.
- Avoid water and all metal objects.
- Get off high ground.
- Avoid solitary trees.
- Stay off the telephone.
- If caught outdoors during nearby lightning, adopt the Lightning Safety Position (LSP). LSP means staying away from other people, taking off all metal objects, crouching with feet together and head bowed, and placing hands on ears to reduce acoustic shock.

The dramatic increase in the reports of Lyme disease over the last decade, particularly in the Northeastern and Northcentral United States, has made tick control and prevention a major concern. The Centers for Disease Control and Prevention recommend the following precautions for personal protection from tick bites:

- Wear light-colored clothing so that ticks can be spotted more easily.
- Tuck pant legs into socks or boots and shirt into pants.
- Tape the area where pants and socks meet so that ticks cannot crawl under clothing.
- Spray insect repellent containing DEET on clothes and on exposed skin other than the face, or treat clothes (especially pants, socks, and shoes) with Permethrin™, which kills ticks on contact.
- Wear a hat and a long-sleeved shirt for added protection.

- Walk in the center of trails to avoid overhanging grass and brush.

After being outdoors, remove clothing and wash and dry it at a high temperature; inspect the body carefully and remove attached ticks with tweezers, grasping the tick as close to the skin surface as possible and pulling straight back with a slow, steady force to avoid crushing the tick's body. In some areas, ticks (saved in a sealed container) can be submitted to the local health department for identification.

Resources for Continued Participation

Magazines

Climbing Magazine
PO Box 339
Carbondale, CO 81623
www.climbing.com
(303) 963-9449

Rock & Ice Magazine
PO Box 3595
Boulder, CO 80303
www.rockandice.com
(303) 499-8410

Outside Magazine
Box 54729
Boulder, CO 800322
www.outsidemag.com

Videos

Just Push Play
Offers a wide variety of "how-to" and action videos on many outdoor adventure sports, including "Basic Rock Climbing," "Vertical Rope Skills," and "Rock Climbing Skills: The Basics and Beyond."
141 Suburban Road
San Luis Obispo, CA 93401
800.727.6689
www.justpushplay.com

The Art of Leading
Chockstone Productions
526 Franklin Street
Denver, CO 80218

Performance Rock Climbing – The Video
1478 East Logan
Salt Lake City, UT 84105

Organizations

The Access Fund
The Access Fund is a national, nonprofit organization dedicated to keeping climbing areas open and to conserving the climbing environment.
PO Box 17010
Boulder, CO 80308-0100
(888) 863-6237
www.accessfund.org

American Mountain Guides Association
The American Mountain Guide Association is a nonprofit organization that seeks to represent the interests of American mountain guides by providing support, education, and standards.
710 Tenth Street, Suite 101
Golden, Colorado 80401
(303) 271-0984
www.amga.com/

Association for Experiential Education
The mission of the Association for Experiential Education is to develop and promote experiential education in all settings.
2305 Canyon Boulevard, Suite #100
Boulder, CO 80302-5651
(303) 440-8844
www.aee.org

Outdoor Recreation Coalition of America
A coalition of businesses and non-profits to represent the human powered outdoor recreation industry.
3775 Iris Avenue, Suite 5
Boulder, CO 80301
303.444.3353
www.orca.org/

Project Adventure
Project Adventure, Inc. has been a leader in the field of adventure education since 1971.
Corporate Office
701 Cabot Street
Beverly, MA 01915
(978) 524-4500

Rocklist
Rocklist.com is one of the oldest climbing-related websites on the Internet. It provides climbing information from all over the world. This includes news, articles, editorial commentary, trip reports, area guides, route information, and much more.

600 West 1st Street
ST. 201-R
Tempe, AZ 85281
ww.rocklist.com/ www.rocklist.com/

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Rohnke, Karl, & Butler, Steve. (1995). *Quicksilver.* Dubuque, IA: Kendall/Hunt.

Rohnke, Karl, & Grout, Jim. (1998). *Backpocket adventure.* Dubuque, IA: Kendall/Hunt.

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"National Lightning Safety Institute", 24 February 2001 http://www.lightningsafety.com/nlsi_pls/ncaa.html

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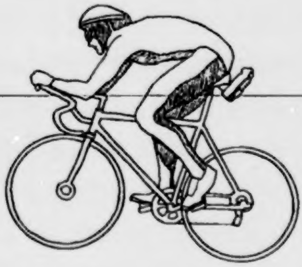
CHAPTER 8

Cycling



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Introduction

Cycling today has as many different forms as there are different types of bicycles. Basically, any bicycle can be used for general transportation, including going from place to place, running errands, or just visiting friends. However, as the cyclist works to focus his or her activity, a more specific type of bicycle is required.

Obviously, a bicycle will perform best when used in the manner for which it was designed. It is important, then, that function be considered when purchasing any bicycle. Some bicycles can perform several functions, whereas others are very specialized to a specific purpose. Whereas a mountain bicycle might be used for general transportation, off-road riding, or fitness riding and touring, a single-speed, fat-tire bike is most likely to be used only for riding short distances in the neighborhood. Ultimately, only the person purchasing the bicycle makes the specific decision, but assistance from a sales person in a bicycle shop is often very helpful.

Terminology

Off-Road Riding

Off-road riding is done on trails, paths, and surfaces other than sidewalks and paved roadways. Although this type of riding is also used for transportation, recreation, or competition, off-road riding is most often the choice for those who enjoy back roads and trails. The only bicycles suited for this type of riding are bicycles with fat, knobby tires and multiple gears capable of climbing hills and steep inclines. More off-road bicycles are sold today than any other type of cycle because they can be used for several activities.

Touring

Touring bicycles are designed to take the rider great distances while carrying everything needed on the road. There are variations in touring because some cycle tourists stay in motels and eat out, whereas others carry all the camping and cooking utensils needed on the road. Some tourists have a sag wagon (a truck or bus provided by a touring company) that carries all their clothing and camping gear for the trip. The variations are endless, but the bicycles always have gears designed to allow the rider to get up steep hills, whether they carry heavy loads or not. Tourists have cycled around the world, from Alaska to Cape Horn, and across continents.

Racing

Bicycle racing includes a variety of riders as well as bicycles. Road races can include both short distances as well as longer distances. The famous Tour de France, a race that lasts roughly a month, covers more than a thousand miles over mountains and across the most beautiful plains of Europe's countryside. There are also races across the United States, races up mountains, and races across deserts. Off-road racing can be in the mountains or in the flatlands, with all types of distances (one is a relay race that takes 24 hours), whereas BMX racing is on short, hilly courses, and the race is over in a matter of seconds. Velodrome racing takes place on an oval track, approximately 1/4-mile, with the races taking only a few minutes to complete. Track racing requires special bicycles that are only used on the track because they do not include brakes!

Time-trial races begin with competitors starting at one-minute intervals and then racing distances of up to 40 kilometers (25 miles). They are not allowed to ride together, and it is a true test of individual fitness. It is the safest form of racing.

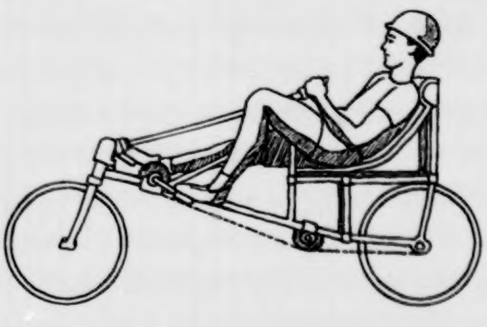
Skill and Fitness Requirements

1. Skills such as proper balance, obstacle avoidance, proper braking, gear shifting, looking back, and straight-line riding involve practice in a safe area and can be highly refined for more demanding recreational and competitive events. Improving skills also makes cycling safer.
2. The fitness level required for cycling is primarily aerobic fitness, which can range from low levels to high levels and is determined by what the cyclist desires to do. Riding in the neighborhood, riding to the store, or riding to visit a friend require only minimal aerobic fitness, whereas racing and long-distance touring may require higher levels. Cardiovascular fitness is the primary fitness component that must be developed, and long-distance riding forms the basis of this training. This type of riding develops the heart and circulatory system so that oxygen can be delivered to the leg muscles used to propel the bicycle. Serious racers of all types must work on weights, sprints, and interval training to round out their total training program.

Skills

To ensure safety, riders must develop basic bicycle handling skills. These can be practiced in a safe environment to minimize the chance of accidents.

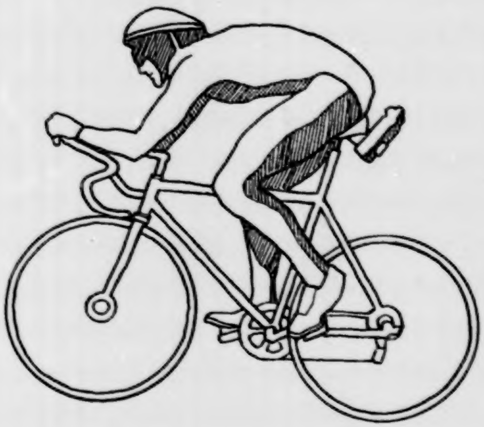
Figure 1. Recumbent Bicycle



These skills include the following:

1. **Quick Turn.** The quick turn is a turn that is used to change direction quickly to avoid road hazards. By turning the front wheel quickly in the opposite direction, the cyclist's weight is shifted in such a manner that the danger is avoided. Quick turns should be practiced in an area away from hazards, with a course consisting of traffic cones.
2. **Braking**. Proper braking involves the use of both brakes in a manner that provides safe and quick stopping. The rear brake should always be applied first, followed by the gradual application of the front brakes. Locking up the wheels and skidding must be avoided to prevent the rider from going over the handlebar or losing control of the bicycle. Braking should be practiced in an area free from hazards.
3. **Shifting**. Proper shifting involves both the smooth shifting from one gear to another and the knowledge of when to shift. Today's new index shifting makes shifting easy, but one must still understand when to shift.
4. **Looking Back.** Looking back while the rider is riding forward is an important skill that keeps the rider from moving into the path of a car or truck approaching from the rear. Riders should equip their bicycles with a rearview mirror for best efficiency.
5. **Straight-Line Riding**. Riding in a straight line is a skill requiring practice before a cyclist moves onto the roadway filled with automobiles. While riding in a group, the rider must learn to ride smoothly without quick changes in speed or direction. When following another rider, the rider must maintain a minimum of a half-bicycle distance to avoid touching the rear wheel of the rider in front.
6. **Hazards.** The rider must learn to cope with hazards such as railroad tracks, poor riding surfaces, water, and animals. Always ride perpendicular across railroad tracks and never try to turn when water, sand, gravel, or leaves are on the road. Maintain speed and turn only after passing the hazard. Avoid holes and large cracks, which cause accidents or ruin wheels. When traveling through water, keep in mind that a hole may be hidden under the water. Do not hesitate to dismount and walk the bike around hazards.

Figure 2. Racing Cycle



If a dog is a threat, be careful, because man's best friend can become the rider's worst enemy. If a dog is hit by a cyclist, the rider will usually fall. If a dog seems to be a threat, shout in your strongest voice, "go home," or "no," and often the dog will return home. Often the dog's owner will hear your voice and will help control the dog. If necessary, dismount with your bicycle between you and the dog. Slowly move out of the dog's territory and then resume riding.

Practice for Improvement

1. Practice all skills in a safe, open area where automobiles can be avoided until the rider has mastered the basic skills. The skills of riding in a group should be practiced in the same manner before taking to the roads with groups.
2. Practice for racing involves riding in groups in high speeds. This can be dangerous, but if a new rider rides with riders with more experience, skills can be gradually improved.

Safety Concerns

1. The first rule of safety is that you should *always* wear a helmet. Helmets used today are light, cool, and inexpensive. Helmets are made in different sizes and colors, so there is a helmet for every rider. The helmet should be worn low on the forehead. Tilting the helmet to the back of the head exposes the front part of the head and leaves it unprotected.
2. Use your eyes and ears to protect yourself. *Never* ride with earphones (this is illegal in most states) because the louder music can mask the sound of approaching dangers.
3. Learn the proper skills before taking to the road. When taking to the road with a group, always ride with riders who have group-riding experience. Follow the rules of the road and remember that cyclists have the same rights and responsibilities as an automobile. Always keep an eye out for automobiles and be prepared to avoid them. Ride on the right side of the road with the traffic. Stay as far to the right as is practical but don't cause an accident by riding too close to the right.
4. Be sure that the bicycle is safe. Brakes, gears, tires, wheels, and seat height should all be adjusted properly before riding. A bicycle shop should be the first stop before taking a trip.
5. Wear proper clothing. All clothing should be bright and suited for cycling. Cycling shorts make riding more comfortable, and bright clothing can be seen by others. Become visible by wearing the proper bright clothing and a helmet.
6. If you ride at night, proper lighting is a must. The law in all states requires proper lighting and reflectors for night riding. A large reflector visible from the rear, one visible from the front, and reflectors on the wheels and pedals are the minimum required for riding at night. A battery-operated flashing red light should also be used in the rear, and a battery-operated head light should also be used. These lights are important because they allow the automobile drivers to see you from several hundred feet.
7. Signal your intentions. Bicycle riders must always use the proper arm signals before turning or stopping. The same signals should be used when changing lanes or avoiding hazards in the roadway. When cyclists are riding with a group, hazards that may cause a flat or an accident should be noted by pointing to the hazard before the hazard is encountered. This will allow riders behind you to make adjustments and avoid the hazard.

8. Protect your eyes against glare and debris by wearing sunglasses.

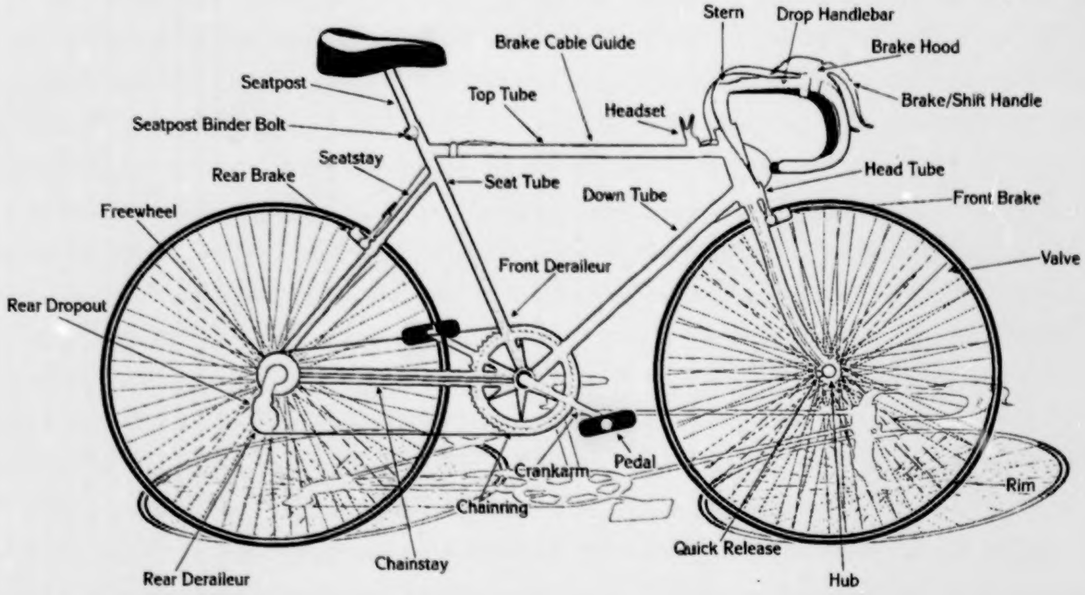
Competition

There are many different types of bicycle competitions. Competition at the highest levels is controlled by state and national federations. These federations promote cycling from the local to the international levels. They also have links with Olympic organizers. National teams are selected by these groups through the use of regional trials and races.

1. **Road Racing:** Road racing is done on streets and highways designed for automobiles. Distances may range from 15 miles to over 1,000 miles, and the race may last several days, with a new leg of the race beginning each day. In mountain bike racing, these long races on trails are called cross-country racing.
2. **Criterium Racing:** Criterium racing is similar to road racing except that it is done on short loop courses that have much spectator appeal. The loop may be repeated several times and can eventually cover as many as 50 miles even though the loop may be as short as one mile long. Mountain bike races off-road have similar types of races.
3. **Time Trials:** Time trials are raced on highways, but riders do not start at the same time. The distance is usually 40 kilometers (about 25 miles), and riders go out from the finish line for half the distance and then return to the start, which becomes the finish line.

   Riders do not ride in packs and are not allowed to ride beside or behind another rider. This type of racing is a true test of physical fitness.
4. **Downhill Racing:** Downhill racing is done by mountain bike racers. They race from the top of a mountain to the bottom of the mountain as fast as possible, with riders taking any course they desire.
5. **Slalom Racing:** Slalom racing is done by mountain bike racers down a slope and is much like skiing. Racers weave their way through poles set up on the slope while racing alone. When one rider is finished, the next rider begins.
6. **Track Racing:** Track racing takes place on an oval track that is usually indoors. These races are generally short and extremely fast. Bicycles for these races have no gears or brakes, and the riders are highly skilled. There are only a few tracks in the United States.

Figure 3. Parts of the Bicycle


Stern
Drop Handlebar
Brake Cable Guide
Brake Hood
Seatpost
Top Tube
Headset
Brake/Shift Handle
Seatpost Binder Bolt
Seatstay
Rear Brake
Seat Tube
Head Tube
Down Tube
Front Brake
Freewheel
Valve
Front Derailleur
Rear Dropout
Crankarm
Pedal
Rim
Chainring
Quick Release
Chainstay
Rear Derailleur
Hub

Rules

Rules are determined by the type of competition taking place. Each rider is responsible for learning the rules for the competition entered. Attend bicycle club meetings, workshops, and informal group rides to learn the rules of the events of interest.

Scoring

Scoring in cycling is usually based on the finish time and place of the rider.

Tactics

Tactics vary depending on the type of racing.

Equipment

1. **Bicycle Selection:** The type of riding will determine the type of bicycle needed. As noted before, some bicycles may be suited for more than one type of riding, but racing requires very specific types of bicycles, and failure to have the right type of bicycle places the competitor at a disadvantage.

Figure 4. 1st Rule of Safety: Always Wear a Helmet

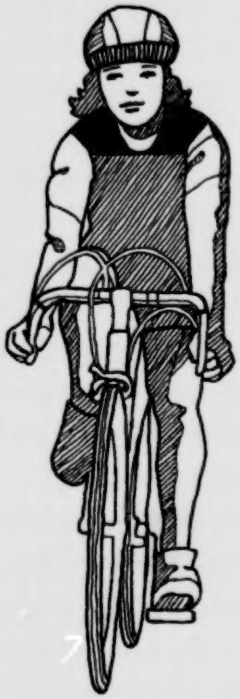
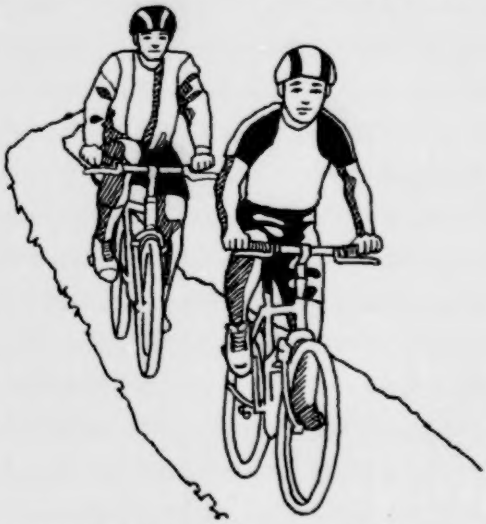
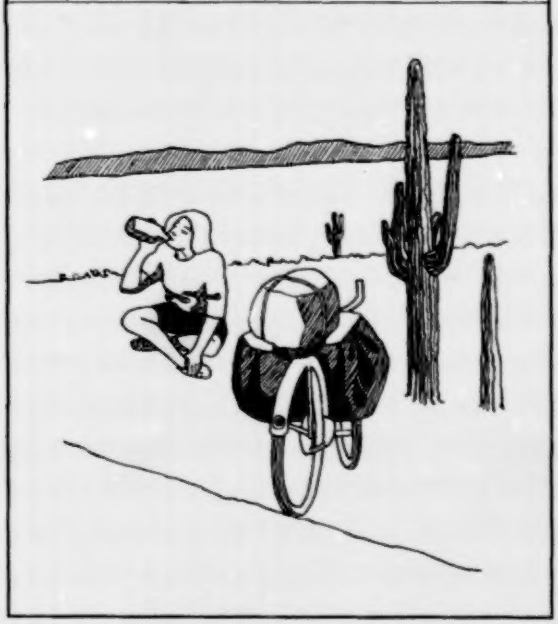


Figure 5. Riding Single File



2. **Clothing and Equipment:** Proper equipment is a must. Protecting the body from the elements and falls requires special types of attire that would be dangerous to participate without. Shorts, jerseys, gloves, helmets, shoes, and repair tools and parts all have a place in cycling.
3. **Bike Adjustment:** It is important for the bicycle that's chosen to be the correct size and have the seat adjusted at the right height. A quick seat check can be done while riding the bicycle. If your leg is straight, with your heel on the pedal, when the pedal is at the bottom of the pedal cycle, then your seat is adjusted about right. Some fine-tuning might be necessary, but this technique is a good place to begin. An inappropriately adjusted seat can cause knee and back pain. When you are riding, the ball of the foot should be placed on the center of the pedal for the best efficiency. When this is done, the leg will have a slight bend at the knee at the bottom of the pedal cycle. A bicycle shop will help to determine the proper size bicycle, but in most cases, you should be able to straddle the bicycle comfortably with about three inches of clearance.
4. **Security:** A bicycle lock may be one of the most important pieces of equipment you can have. Your bicycle must be locked any time it is left alone. A thief can take a bicycle in a matter of

Figure 6. Touring is a Popular Sport



seconds. U-locks are preferred, but a small chain and lock will do well. A bicycle should never be left outside where a thief can have time to disable the lock.

Riding Areas

Bicycle riders can ride just about anywhere it is safe to do so. Tours take riders all over the world and on many different types of roadways. Riding areas should be safe and legal. Riding on a narrow, busy roadway is dangerous, and it is against the law to ride on some roadways such as interstate highways. Check the local laws in your community before riding on sidewalks. If you decide to ride on the roadways with automobiles, behave as an automobile driver and follow the same rules. Never ride against the traffic, and stay as close to the right of the roadway as is practical.

1. Riding on the highways requires skill and care. Follow the rules of the road and signal your intent. Ride with the traffic flow.
2. Riding on paved walkways is often illegal. Check the rules before riding on sidewalks and similar surfaces in parks and communities.
3. Riding off-road is illegal in some areas. Be sure not to trespass on private land.

Participants

1. Touring can be done in groups or alone, depending on the desire of the rider.
2. Road racing is generally done in teams. Team members assist one another by taking turns blocking the wind; they may even attempt to slow a race so that a teammate may catch up to the main pack of riders. This is called blocking.

Resources for Continued Participation

Most communities large enough to have bicycle shops will have established bicycle clubs. Joining one of these clubs provides the opportunity for information necessary to get started in cycling competition and recreational activities. There may be opportunities for racing, touring, fitness riding, and off-road riding, depending on the location of the city. The Internet is an excellent source of cycling information because most clubs have websites. Bicycling is a lifetime activity with excellent health benefits; in fact, there are many cyclists in their 70s and 80s riding hundreds of miles per year for transportation and recreation.

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CHAPTER 9

Dance Education

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Introduction

Dance

Dance is purposeful, choreographed, movement that is performed with or without accompaniment and employs the elements of time, space, and energy. It is rhythmical, culturally influenced, and aesthetically valuable. Dance training is a serious study of the specific dance movement skills and techniques for mastery and performance. Specialty areas are technically demanding. Dance supports the development of a supple musculature that responds to choreographic demands. The body is the instrument of expression using symbolic movements. Compositions, choreography, and improvisations in dance evolved into artistic forms. Dance is a unique, powerful, and historic form of communication.

Dance Education

Dance education is a separate, core class and academic area of instruction. Dance education in physical education is a balanced and sequential subject area or unit(s) taught within the context of the physical education class. Dance in education enriches the academic classes with parallel or cross-disciplinary instruction as dance curriculum integration or infusion. Performance dance is a form of classical entertainment, whereas participatory dance is recreational. Exposure to the different forms and skills of educational dance creates appreciation of the knowledge, techniques, and choreographic elements that culminate in dance performances.

Dance Preservation

Preserving choreography helps mankind understand and appreciate dance evolution. It exemplifies the historical, cultural, and personal impact on society in diverse cultures and times. Exposure to the different forms of dance allows participants to celebrate the evolution and historical development of the many traditional dances and choreography that remain today. Dance historians and archivists preserve the cultural heritage and authenticity with documentation by written forms, photos, Labanotation (form of dance shorthand), film, videos, and dance technology. They retain the original choreography, scenery plans, costume sketches, and aesthetics of all dance forms for future generations. The total involvement of learning attributed to dance needs to be kept alive.

Terminology

Adagio. A dance employing slow, flowing movements, usually in 3/4 time.

Allegro. A dance employing faster movements such as springing leaps and skips.

Barre. A wooden pole attached horizontally to a wall for balance in dance techniques.

Change of Weight. The transfer of weight from one foot to the other.

Choreography. The art and craft of composition or planning, arranging, and creating dance movements based on specific choreographic elements, improvisation, and compositional forms.

Costumes. The clothing worn by dancers in a performance, including but not limited to, attire, tights for the legs, specialty shoes, tutus or skirts, head pieces, jewelry, etc.

Craft. The learning and appreciating of the skill, artistry, history, and anatomy of dance.

Dance Attire. The clothing worn for a professional dance class, including but not limited to, leotards for

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the body, tights, specialty shoes, sweaters, leg warmers, etc.

Even Rhythm. A particular rhythmic pattern where the beats have the same note or line values and are all short (quick) or all long (slow), including 2/4, 3/4, and 4/4 time.

Forms. Specific classifications of dance as ballet, modern, ballroom, folk, etc.

Improvisation. A spontaneous creation of individualized movements without a pre-determined pattern, based on imagery, ideas, themes, emotions, etc.

Placement and Alignment. The training and relationship of the body to the line of gravity and support base conforming to a certain form or style of dance or technique.

Rhythm or Meter. The accent and pattern of the music and/or the dance.

Rhythmic Pattern. The grouping of the beats that repeat for the pattern of a particular dance step and correspond to the underlying beat.

Style. The interpretation of technique or choreographic choice such as lyrical, romantic, etc.

Techniques. The training methods in dance to develop a particular style of dancer.

Uneven Rhythm. A specific rhythmic pattern where the beats are not of the same note or line values but combine short and long beats for an uneven pattern such as 1&, 2&, 3& etc.

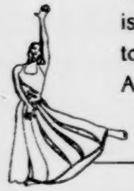
Fitness Requirements

Before undertaking any dance education activity, a healthy, fit body is necessary. Passing scores on fitness and screening tests are essential. Health requirements for the school district should be met. Calculate heart rates after specific portions of the dance class to monitor target heart zones. Supply medical documentation for any participants who are differently abled or who have chronic or recent illnesses, conditions, or injuries that warrant attention. If a medical advisor recommends limited participation, adaptive and corrective dance activities are available. Medically mandated nonparticipation is rare.

Skills

Intellectual, perceptual, and expressive skills, as well as technical dance skills, are needed. The foundation is the basic knowledge and technical dance skills or tools in a planned lesson and the creative processes. A dance education lesson contains four basic divisions. These are the (1) goals and objectives, (2) skills, (3) choreographic elements and compositional forms, and (4) assessments. Ask the instructor for the goals. The objectives are the measurable achievements for the class. Sample class objectives are listed under Practice for Improvement. The skills include the knowledge and techniques. The knowledge is the terminology, evolution, classifications of dance, and accompaniment. The techniques include the warm-ups (barre and center), center floor with low-impact activities (adagio and port de bras), combinations with high-impact activities (allégro), and culmination (cooldowns). The choreographic elements and the compositional forms are listed separately but are taught within the techniques right before the culmination portion of the lesson. The instructor provides the required class assessments and the grading process.

The National Dance Association (NDA) and the National Association for Sport and Physical Education (NASPE), most state departments of education, and local school districts have established dance education standards for students in grades K-12. These are used to formulate the goals, objectives, skills, and assessments for a quality program. Your instructor will define the specific objectives for each class that provide standards-based lifetime competencies in dance education.



Knowledge

Evolution

The original purpose of dance was to transmit occupational skill, customs, and religion to the children and youth. It is an integral part of personal human culture, society, and history from ancient times until today. Through the ages, dance evolved for many reasons. It was influenced by religion, education, health, and fertility. It is an aesthetic need of mankind. Dance is also performed for ceremonies, dramatics, animal mimicry, socialization, initiations, war, weapons, marriage, astrology, story telling, celebration, and entertainment. Climate, native clothing, folklore, topography, religion, music, culture, and careers influence all dance and choreographic forms and styles. Choreography or dance composition is an orderly arrangement of movement patterns, in a specific form or structure, to complete the meaning of the dance. There are many compositional forms and dance classifications. The evolution of dance through the ages includes specific social development, historical and cultural significance, choreography, formations, costumes, and musical accompaniment.

Primitive Dance was a way to bridge the gap between man and the world of demons, spirits, and gods. Movements and formations were simple (circles and chains) and imitative, and the sexes were separated. These participatory dances were for religion, war, fertility, animal imitations, nature, and other themes. They used primitive percussive instruments for accompaniment and native dress.

Egyptian Dance was expressive, religious, and emotional. It was social entertainment and included acrobatics, religious moves, and gesturing. Movements and formations were expanded. Dances were choreographed, not spontaneous. Professionals, peasants, slaves, and religious dancers were prominent, with costumes worn by professional dancers. Performance dance was born.

Hellenic Dance consisted of agility and strength moves (Sparta) for both sexes and aesthetic satisfaction (Athens). Dance themes were religion, athletics, war, society, and theatrics. There was great variety of movements, designs (circles, lines, and labyrinths), and choral dancing. Theatrical performances had elaborate costumes and live accompaniment.

Medieval Dance (in the Middle Ages) was dormant and in disfavor with secular dancing bans. Procession (ritualistic) dances were sanctioned and consisted of single or double files of dancers, church attire, and simple or no live accompaniment.

Renaissance Dance included pre-classic dance forms, court dances, folk dances, and ballet. Folk dances were simple designs with complicated steps and lively rhythms. Ballet was stereotypical movements danced by professional groups. Court dances were performed by the nobility and taught by dance masters. These were simple group formations, elaborate floor patterns, and complicated movements, with live accompaniment from an orchestra and/or singers. Court and ballet dances had extravagant and ornate costumes.

Post Renaissance includes the most widely recognized classifications of dance today. These are modern, ballet, tap, jazz, folk, square, creative, musical theater, and ballroom or social dance.

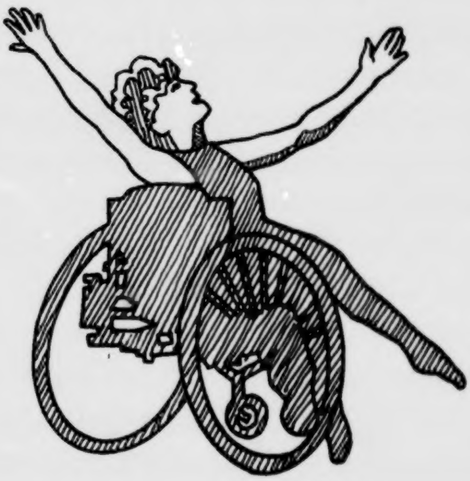
Classifications of Dance

Dance education developed into specific forms. A knowledge orientation to all dance classifications enhances understanding of the development of the forms through the ages. The recognized classifications taught in middle and high school physical education classes for a balanced curriculum are as follows: creative, modern, international folk, square, adaptive, and ballroom or social dance. Creative and modern dance education (K-12) includes the expressive and improvisational elements. Folk and square are cultural dances. Adaptive dance education adjusts the activities for differently abled students. Ballroom is necessary for students to participate in after-school dances and social activities. Though widely known, tap, jazz, musical theater, and ballet are usually taught in fine arts schools, dance academies, professional training schools, and magnet schools. These are encouraged and recommended, but resources may be limited. Aerobic dance is a form of physical fitness training and is not normally called a classical dance form.

America's heritage consists of dances native to the United States. Indian, modern, square, tap, jazz, and some ballroom dances are traditional dances. Musical theatre, country western, Appalachian clogging, and Cajun are native dances. Creative and adaptive dance are the most recent additions. Fad dances come and go continuously with the times. Today, many professional performing dance companies represent all dance disciplines and classifications.

Cultural influences, costumes, music, steps, and formations are varied and wide. The history, cultural significance, step patterns, formations, attire, musical accompaniment, artists, and choreographers are listed here. Dance education includes different forms for everyone to enjoy.

Figure 1. Adaptive Dance



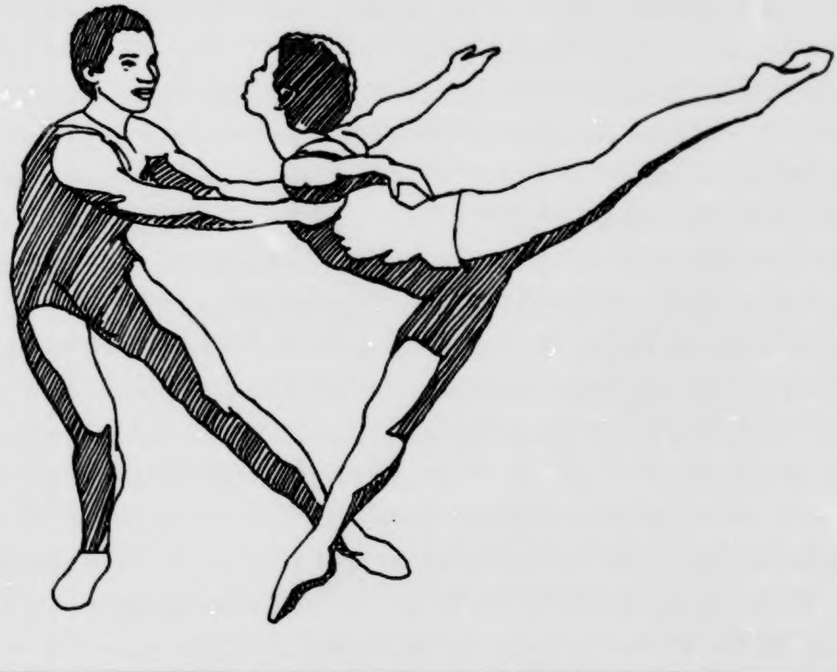
Aerobic Dance is any sustained, moderately strenuous exercise activity to music that is continuous and uses primarily the large muscle groups. It is called "dance" because it usually includes specifically choreographed routines. These are low-impact, high-impact, freestyle, and a combination of high/low impact. It began in the early 1970s with Jackie Sorensen as a result of the physical fitness craze. It utilizes specific, repetitive foot patterns for producing beneficial physical effects. Aerobic attire and specific footwear are worn, and accompaniment includes classical to popular recorded music. It does not possess a classical dance technique, and there is no performance or entertainment aspect for an audience.

Adaptive Dance is an outgrowth of mandated Public Law 105-17. It incorporates or "adapts" movements in a class of abled (stand up) and differently abled (sit down) dancers. It is any form of dance and performance depending on the specific bodies and style of the dancers.

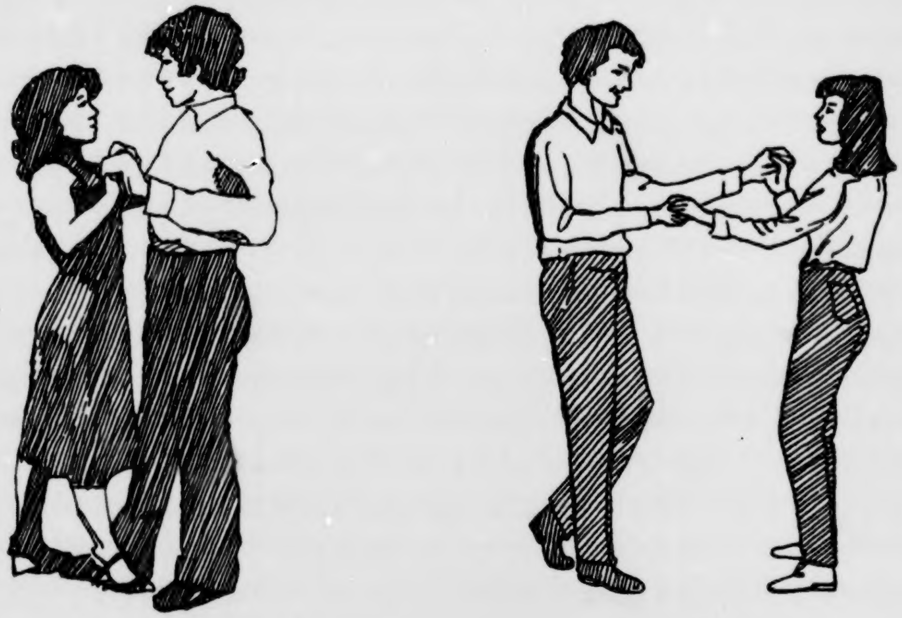
Ballet is a romantic dance form created in the classical style and based on centuries of tradition. It was codified in the court of Louis XIV with traditional French movement vocabulary and structured, methodical technique. It is a theme or story, though modern dance influences are reflected in recent choreography. Ballet origins are European. A live orchestra usually performs to classical music. The movement principles are the technical foundation of all dance forms. Elaborate costumes characterize the earlier years, but today's ballets incorporate movement-friendly, less cumbersome ones. The men wear soft shoes, but the female dancers perform in toe or pointe shoes. There are distinct training methods that require years of study. The different pedagogies include the following: Cecchetti (Italian), Bournonville and Vaganova (Russian), School of American Ballet (USA), Beauchamp (French), Royal Academy of Dancing (England), Balanchine (American), and Danish. Styles of ballet include classical, neoclassical, contemporary, lyrical, and others. Artists and choreographers include Nijinsky, Galina Ulanova, Margot Fonteyn, Arthur Mitchell, George Balanchine, and Mikhail Baryshnikov.

Ballroom/Social/Recreational Dance began with the court dances of the European heritages. Ballroom dance usually refers to the more stylized professional performances and early dances, whereas social dance refers to the dances of the common people, for recre-

Figure 2. Ballet



Figures 3 and 3a. Ballroom and Popular Dance



ation. Court dances were performed by nobility and the rich. Around 1884, dance masters were hired for formal balls to teach elaborate step patterns and incorporate costumes and musicians. The minuet is a well-known formal court dance. Cajun dances and music are derivatives from Acadian-French settlers in Louisiana in the late 1700s. The waltz, two-step, and jitterbug are still performed today. Ballroom dances native to America are the Charleston, Swing, and Black Bottom. Round, novelty, and mixer dances began in America with European influences.

There are many forms and styles of ballroom dance popularized in the United States, including the waltz and foxtrot in the 1900s. The waltz is an offshoot of the early court dances. In the 1920s, the Charleston and other American ballroom dances were born. Swing began in the 1930s–1950s, with a resurgence in the 1990s. Round and novelty dances and mixers are Americanized dances that began in the 1600s and appeared again after 1945. In the 1960s, novelty dances such as the swim and twist were prominent. In the 1980s and 1990s, country western dancing became popular. Play party games are an American tradition, such as the bunny hop. Latin dance of many types is popular today, but its origins were not American. Popular or "fad" dances such as break dancing and hip hop continue to change with the times and music. Other social dances are the Charleston, disco, foxtrot, and cha, cha, cha.

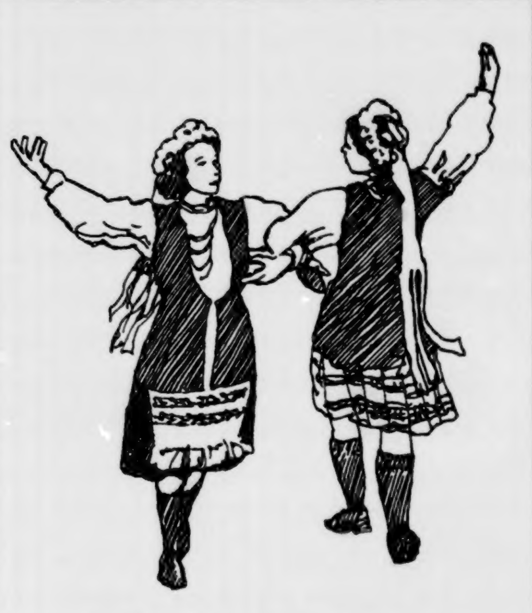
Current ballroom dance is used for performance and social gatherings. It is partner dancing with basic steps and patterns. Couples move about the dance floor with no relationship to each other in recreational forms. Professional ballroom competitions are precise, choreographed dances with music and elaborate costumes. The professional dancers wear character and specialty shoes. Many ballroom competitions exist, and ballroom dance sport is now in the Olympic games. There are many fundamental dance formation and dance positions for partners and groups. The more popular ballroom dances are described under traditional movements as the waltz and swing. Some of the well-known dances are listed here. Latin dances such as the Salsa (sauce) began in the 1960s with the influx of Cubans to the United States. It utilizes 4/4 cut time with a quick, quick, slow rhythm and is performed to Afro-Cuban jazz music. A firm upper body accents hip and ribcage moves. Other ballroom dances are the tango, samba, mambo, calypso, merengue, and the bossa nova. Flamenco and Mexican folk dances can

be performance dances.

Country Western Dance evolved as a form of grassroots dance, typically using a fiddle. It is influenced by spirituals, square dancing, Dixieland jazz, and big band styles. It evolved into the stylized "cowboy dances" such as the Texas two-step. Cowboy boots and attire predominate with country western music. It develops different regional styles throughout the United States. At dances, many different country western forms simultaneously take place. Step patterns are precise and calculated and glide across the floor. Line dances are an outgrowth of the 1960s and 1970s simplistic dances such as the hustle and bus stop. Line dance steps are simple, repetitive, and change direction often. Country western line dances popular today are the Cotton Eyed Joe and Electric Slide. Line dances are responsible for getting people to dance who are not usually comfortable with more traditional ballroom dancing.

Creative/Educational Dance provides opportunities for individuals and groups to use dance as a form of innovative expression employing modern dance concepts and processes in an educational setting. It is advocated as a core subject area in grades K-12. It is a form of artistic and physical expression. Curriculum integration and special dance projects and artists are utilized. Accompaniment varies from classical to abstract and is either live or recorded but usually without lyrics. It utilizes basic traveling and nontraveling moves and exploratory techniques and compositions.

Figure 4. Folk Dance; Ukranian Girls Dance

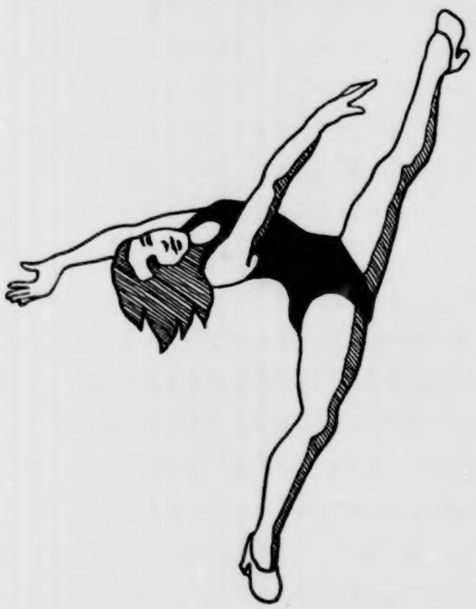


International Folk/Ethnic/World/Multicultural/National Dances are the traditional dances of the common people of Europe and other countries and relate to each country's original customs, rituals, and the occupations of the people that brought them to America. Exposure to the dances of different cultures and countries teaches ethnic diversity in a positive, enriching way. Traditional steps and music typical for the country are used, sometimes with songs. Daily elements such as climate, work patterns, racial origins and relations, and social traditions dictate the movements. It is the rural or peasant form of the formal ballroom dances. Square dance and Appalachian clogging are true American dance forms. Truly authentic folk dance is specific traditional choreographed step patterns, music, and costumes handed down through generations. Many "pure" forms of folk dances from specific countries are being lost.

There are other forms of folk dances that have characteristics of their own. Character dances were created to fit characteristic steps to traditional and ethnic folk tunes. This terminology is sometimes used interchangeably to mean folk or ethnic dance. Appalachian clogging began in the United States in the 1700–1800s. The three types are freestyle, square dance, and precision clogging. Actions are similar to tap dancing. Shoes are leather soled and either with or without taps. The women wear short skirts. Today's cloggers use "jingle" or two-part taps on their shoes for dynamic sounds. Fiddle, banjo, and folk music of the 19th century and bluegrass and hoedown music is accepted.

American Indians created the first Native American dance and continued their dance heritage despite colonial invasions. Traditional costumes, simple step patterns and themes, live accompaniment, and simple circles and formations are characteristics. The dances are for health, rain, and war. Traditionally, men performed and women observed. As the numbers of Native Americans are decreasing, there is a need for a concerted effort to preserve the history of our Native American heritage dances, costumes, and music. Contra dances began in the British Isles and were danced by colonists in America. It is a dance of opposition. The performance formation is a double line, with the couples facing each other on opposite sides of the lines. Some people characterize contra dance as a separate category, although it began as folk dance. African dance began in America with the slaves as

Figure 5. Jazz, Tap Dance



they retained their original folk and traditional dances and created their own. Sacred dances of blacks retained their original African religious heritage. Percussive rhythms, quick step patterns, hip movements, low turns, and levels characterize these dances. They utilize lines and simple formations

Jazz and Tap Dance evolved from African folk dances brought to America by slaves. The slaves continued their traditional African dance traditions but created their own American versions. It was pure entertainment. Tap, dance pantomime movements, and acrobatics requiring endurance and skill characterized the African folk dances of the 1830s. They were a blend of the tribal dances and Caucasian influences. The reels, squares, jigs, quadrilles, and special occasion dancing influenced tap and jazz. English and Irish clogging dances and ballroom dances such as the Charleston and Black Bottom were incorporated. Both began as popular entertainment and informal street dancing and are eclectic forms with little standardized technique, costumes, or accompaniment. Characteristics include syncopated rhythms, percussive music, and agile footwork. A variety of accompaniment, such as jazz, syncopated rhythms, popular music, or none at all is used. During the 1920s to the 1940s, jazz evolved with tap, as both were danced to similar music. Jazz and tap dancing appeared in minstrel shows, vaudeville, nightclubs, films, and Broadway musicals. Elaborate costumes, music, and staging are later characteristics. Jazz and tap are influenced by the craze dances of the 1950s, 1960s and 1970s, as well as by stage and television. They are now refined into two distinct and separate forms of dance with formal techniques and styles.

Types of tap dance are as follows: soft shoe, character, buck, military, and waltz routines. Tap dance employs single, double, and triple sounds, combinations, and time steps. Tap shoes have metal "taps" screwed into the front and back of the shoes and are loosened for more jingle effects and syncopation. Syncopated music and percussive sounds are used in both. Tap artists are Bojangles Robinson, Ann Miller, and Honie Coles.

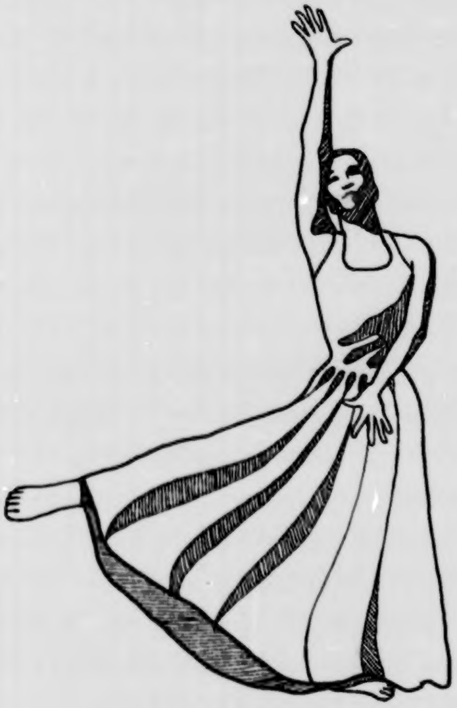
Jazz dance evolved into different techniques and styles such as Fosse. It utilizes stylized walks and body positions, intricate step patterns, and energetic, forceful movements. The choreography is crisp, powerful, and entertaining. Jazz shoes are soft and laced with a small heel attached. Jazz personalities are Gus Giordana and Luigi.

Tap and jazz artists and choreographers include Gene Kelly, Ray Bolger, and Bob Fosse.

Musical/Theatre/Broadway Dance evolved as an eclectic dance form including the various forms in musicals on Broadway, in theaters, and in films. It includes ballet, jazz, tap, modern, etc. It is lavishly produced for marketed entertainment purposes with professional stylized costumes, a variety of musical accompaniment (live or recorded), and professionally choreographed routines to suit the title of the event. Song and dance are often employed, along with acting. Peter Gennaro, Fred Astaire, and choreographer Jerome Robbins are musical theater dance personalities, as are some of the jazz and tap people listed above.

Modern/Contemporary/Freestyle Dance began as a revolt in the 1930s against the rigid codified technical forms of ballet. It moved to a free form of symbolic movement. It is organized and integrated into dances as personal expression using creative processes. It is based on locomotor and nonlocomotor movements and combinations. Modern dance has basic technique and choreographic styles established, but each differs and constantly evolves. It is characterized by inventiveness in compositions utilizing space, time, and energy. Improvisations and extemporaneous movements are

Figure 6. Modern Dance



explored and encouraged. Accompaniment can vary or be nonexistent. Costuming in modern dance, as the dance itself, is individualized and creative. Shoes are rarely worn. Agnes DeMille, Martha Graham, Merce Cunningham, Isadora Duncan, Ruth St. Denis, Ted Shawn, and Twyla Tharp are modern dance artists and choreographers.

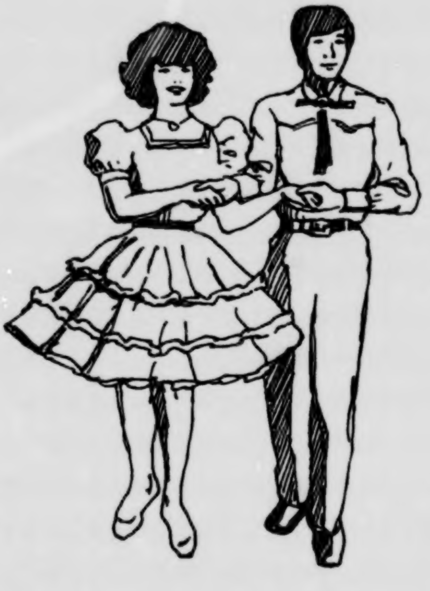
Square Dance evolved as the first colonial, traditional American dance. It evolved from the English country dances and French cotillion and quadrille patterns. Plain folks danced for barn raisings and husking bees. Quadrilles and contra dances evolved into American square dance. A square formation is formed by four sets of couples, each couple facing the center of the "square" with their backs to different walls. The man is on the left and the lady on the right. Shuffle steps, locomotor patterns, turns, and formations are danced. It is a form of recreation and performance, and the music is usually played by a fiddler. A patter caller verbalizes or sings a variety of actions in a certain pattern so that each couple finishes in the home or starting position. A singing call is predetermined moves, but patter calls are not. The four parts are opener, main figure, break, and ending. Character or soft-soled shoes are worn. Men wear traditional cowboy outfits. The women wear full skirts to emphasize the twirling, turning moves.

Dance Accompaniment

Music accompanies the different types of dance and performances. It varies from classical music to country western to eccentric or none. Live accompaniment is preferred, but high-quality recordings are acceptable. An understanding of the basic musical elements and structures are important. Knowledge of music and the sources of accompaniment are necessary for choreographers. The accompaniment suits, compliments, and enhances a dance performance.

Common time signatures or musical meter for dance accompaniment in class and/or performance is 2/4 (two counts), 3/4 (three counts), 4/4 (four counts), 5/4, 2/2, 3/8, 6/8, and 12/8. The top number signifies the number of beats in a measure, and the bottom number indicates the note that receives one count. Mixed meter varies. Tempo can be fast (allegro), moderate, or slow (adagio), regardless of the meter, and can affect the mood of the dance. The elements of rhythm include tempo, accent (the prominent note), phrasing (units or measures), and rhythmic patterns (primary

Figure 7. Square Dance



and secondary). The rhythmic devices include patterns (sequences), twice as fast or slow, resultant rhythm (combines two different meters), syncopation (accent on the notes usually unaccented), poems, songs, etc.

Techniques

All of the movements are performed on both the right and left sides of the body. French terminology is used for many dance skills and is the universal language of ballet dance. The most recognizable French and English interchangeable terms are included below for clarity.

Introduction to Positions

Feet Positions (standing) are parallel (turned in) or with a turnout (from the hip).

First – heels together

Second – feet shoulder width apart

Third – the heel of one foot touches the arch in the middle of the other foot

Fourth – (stride)-one foot is in front and one is in the back with a space in between

Fifth – the heel of one foot touches the large, bony protrusion (past the large toe) of the other foot

Leg and Feet Positions (sitting) are for stretching, warm-ups, and center floor techniques

First – both legs together in front (parallel)

Second – both legs out to the side (apart)

Third – the front leg is bent at the knee on the floor in front, and the opposite leg is straight and out to the side in front (hurdler position is not recommended)

Fourth – the front leg is bent at the knee on the floor in front, and the opposite leg is bent at the knee on the floor in the back or "Z" position (caution advised)

Fifth – both knees are bent in front, with the knees facing the sides, and the soles of both feet touch in the middle (holding the toes increases sickling; hold the ankles)

Arms and Upper Body Positions (port de bras) are nonlocomotor movements/ isolations of the arms and upper body into stylized patterns. They correspond with the feet positions standing or sitting but can be used with any movements. There are many variations of each of these. The arms are curved, long, flexed, angled, in V positions, or with elbows down or out, etc. Hand positions vary from long, curved, flexed, fisted, palms front or back, or fingers spread or closed, and many others depending on the form of dance or choreography. They include the following arm positions:

First – arms are forward and in front of the chest or low in front of the body

Second – arms are apart and to the side

Third – one arm is up and the other arm is to the side

Fourth – one arm is up and the other arm is forward

Fifth – both arms are overhead

Warm-Ups

The warm-ups prepare the body for the physical activity in the class. Warm-ups are performed to 3/4, 2/4, 4/4 meter or tempo and others. These are listed in the order taught rather than alphabetically. These techniques are learned at the barre or in the center on the floor (a terre).

Small Bends (demi-pliés) – bending of the knees in the five foot positions parallel or turned out with both feet in contact with the floor

Full Bends (grande pliés) – bending of the knees in the five foot positions parallel or turned out whereby the heels gradually rise off the floor as the movement goes down and gradually returns with both feet in contact with the floor

Risers (rélevés, élevés) – rising slowly onto the balls of one or two feet in a demi–pointe ("half toes") position, usually preceded by a demi-plié

Points (tendu and degagés) – extending and stretching the toes and foot in a long line without weight on the foot; performed on the right and left sides

Rotary Leg Circles (rond de jambes) – circling the pointed or flexed foot clockwise (en dehor) and counter clockwise (en dedans) on the floor or in the air (grande ronde jambe en l'air)

Brushes (batteménts) – series of leg and foot movements off of the floor graduating to different angles or degrees according to the flexibility and strength of the dancer

Develops (développés) – when the working leg lifts to retire positions at the knee and extends forward, sideward, or backward. (Fondue is a plié and a développé)

Isolations – using the body parts in nonlocomotor movements. Separate movements of the head, neck,

shoulders, arms, ribcage, waist and trunk, abdominals, legs, hips, calves, feet, ankles, back, and other body parts are isolated and performed.

Slow, Easy Warm-Up Stretches – use for all the body parts

Swings (balancoire) – leg, torso (body) and arm movements done in a pendular fashion

Center Floor Techniques (Adagio)

The center floor continues warm-ups with more challenging traveling movements (low-impact activities) on the floor (or a terre).

Basic Movements

The basic fundamental, traditional movements that dances are based on are locomotor and nonlocomotor skills (even and uneven patterns), combinations, and traditional movement combinations. These are taught in the center floor and traveling across the floor.

Nonlocomotor or Axial Skills are stationary skills based on flexion, extension, and rotation performed without locomotion (i.e., in stationary positions) while standing, kneeling, squatting, lying, or seated. They are incorporated along with locomotor skills for total body movements in dance. The types are as follows: pushing, pulling, twisting, turning, rising, falling, bending, flexing, swinging, swaying, striking, and dodging. The nonlocomotors skills also include the isolations performed in the warm-ups in class.

The Locomotor Skills are traveling skills performed while locomoting on a moving base through space as in walking, running, skipping, etc., and are used in all dance forms.

1. **Even locomotor movements** – performed to an even rhythm—2/4, 4/4, and 6/8 meter

   Jumping – push off of two feet, suspension, and landing on two feet

   Hopping (sauté) – push off of one or two feet, suspension, and landing on one foot

   Leaping (jeté) – push off from one foot, reaching with the other foot while traveling (in suspension or in the air) and landing on one foot

   Running (couru) – fast transfer of weight from one foot to the other with a short airborne element

   Walking – transfer of weight from one foot to another while contacting the floor

2. **Uneven locomotor movements** – performed to an uneven rhythm as 1&, 2&, etc. (to 2/4, 3/4 and 6/8 meter). These are performed while alternating feet.

   Galloping (pas chassé) – step, leap, step in a forward or backward direction

   Skipping – a hop and a step performed beginning on the upbeat (&1, &2)

   Sliding (glissade) – a step, leap, step in a lateral direction

   A slide and a gallop are the same movements performed in different directions

Combinations (Allégro)

The combinations are high-impact (allégro), vigorous, traveling movements performed on the floor (a terre) and in the air (en 'lair). They include auxillary and connecting moves and incorporate the center floor techniques, basic steps, traditional dance moves, turns, falls, and recoveries.

Basic Steps

These are basic steps used in Appalachian clogging and tap (with taps attached). Country western, jazz, and other dance forms use these steps without taps on the shoes. Each is performed in 2/4, 4/4, and other meters.

Ball change – step back on the ball of one foot and step forward fully with the other foot (uneven rhythm)

Flap – a brush and a tap with the same foot (uneven rhythm)

Bleking, Heel, Heel Dig – sliding or placing the heel of one foot on the floor (even rhythm)

Shuffle – a forward and backward brush of one foot used in tap and square dance (uneven rhythm) (also $^3/_4$ or waltz meter)

Two-step – step forward, close the other foot to the first foot, step forward with the first foot, or step, ball change (uneven rhythm)

Traditional Dance Movements

These are used in folk, modern, ballroom, square, etc.

African steps – low steps to high steps using levels, hip, and ribcage movements, and turns to percussive music (even and uneven)

Forward and back – walk forward and backward, 4/4 meter (even rhythm)

Grapevine (pas de bourré) – step side, step crossed in back, step side, hold, while alternating feet, 4/4 meter (even rhythm)

Mazurka – step on one foot, cut the other foot, hop on the first foot, 3/4 or 3/8 meter (even rhythm)

Pedaling (prances) – a modification of a run including a series of foot movements where one foot pushes on the floor (toe to heel) as the other foot lifts upward off the ground, like a horse prancing to 2/4, 4/4, and 6/8 meter (even rhythm)

Polka – hop on one foot, then step, step, step while alternating feet. Performed forward, backward, sideways, and in a circle using a 2/4 or 6/8 meter (even rhythm)

Schottische – step, step, step (alternating feet) and a hop, 4/4 meter (even rhythm)

Square Dance Movements

Do si do – from your place, walk forward, then pass your partner by right shoulders, pass back to back and pass them by left shoulders and walk backward to return to your original positions (arms are folded in front of the chest)

Right hands around (allemande right) – clasp your partner's right hand or forearm, walk around in a clockwise pattern and return to your same place

Left hands around (allemande left) – clasp yours partner's left hand or forearm and walk around in a counterclockwise pattern and return to your same place

Both hands around – clasp both of your partner's hands or forearms, walk around in a clockwise pattern and return to your same place

Bow – gentlemen bend at the hips in acknowledgement of their partner

Curtsy – ladies put one foot behind the other, bend both knees and acknowledge their partner

Promenade – walk your partner counterclockwise in a circle to the original place

Step hop – a step and a hop on the same foot, 4/4 meter (even rhythm)

Swing/Jitterbug/Lindy/Shag/Rock and Roll – step, step, step rocking back, step, while alternating feet. Variations are single, double, and triple steps in 4/4 and cut time. Dig steps and hops are sometimes added (even and uneven rhythm)

Triplets – a modification of the walk where the movement goes down, up, up or demi plié, rélevé, rélevé, alternating feet, with the first step accented, 3/4 meter (even rhythm)

Waltz (balance) – step, close, step pattern with alternating feet performed forward, backward, sideward, in a square, in a circle and turning to 3/4 meter (even rhythm)

Turns

Turns are propelling the body in a circular pattern using different step patterns in clockwise and counterclockwise directions and in the air. Turns are performed pushing up onto one foot or two feet, transferring weight from one foot to the other (right and left feet alternating), or pushing and turning in the air. Turns begin and end with demi-pliés for safe delivery and landings. Following are types of turns: chaines, chassé, pivot, paddle, pirouette, pencil, piqués, fouettés, etc. Meter is 3/4, 4/4, 2/4, and other tempos according to the type of turns.

Falls/Recoveries

Falls/recoveries are reacting and recovering moves performed sideward, backward, forward, spiraling, etc.

Culmination

The culmination is a cooldown activity to adjust the body to its original heart rate level. This portion of the class reviews warm-ups, skills, combinations, and stretches.

Choreographic Elements

Compositions and choreography focus on identifying and understanding basic dance techniques, creative processes, and compositional forms for student creations. The choreographic elements include creating, performing, and responding to dance and the compositional forms. The compositional forms are included along with evaluations. These relate to the standards for physical education and dance. The stage floor classifications help identify and map the stage movements. The choreographic elements include exploratory movements, improvisations, group and individual studies, and compositions.

Creating

This is the approach of initiating explorations and providing creative design elements for group compositions. Single compositions are for advanced students. Class time is provided for improvisational studies initiated by themes, emotions, etc. The body is utilized with the elements of space, time, and energy. The elements help solve movement problems, develop collaborate solutions, communicate meaning, and create improvisational studies. Knowledge of the compositional forms is an important tool. Here are the basic concepts for creating dance.

Space

General space – the total space of the room in which a person can move.

Self-space – the space occupied by you and not interfering with another person's space

Shared space – the space occupied when two bodies are moving very closely and interfering with individual self-space

Floor patterns – designs (shapes, pathways, or imaginary outlines) of the dancer's floor movements

Spatial patterns – designs made in space by the dancer's movements

Symmetry – balanced design

Asymmetry – an unbalanced or irregular design

Shapes – body designs in space that can be classified as curved, spiral, angular, and others

Directions – forward, backward, sideward, right, left, diagonal, circular, spiral, etc.

Energy

Dimension – the size of the movement

Range – the distance traveled or covered in space

Focus – the dancer's line of direction and/or concentration on a fixed or moving point

Levels – change from low to medium to high or combinations in relationship to the floor

Dramatics – accents

Force or Dynamics – amount of energy and/or effort

Proportions – change for the body, and spatial or floor patterns (large to small)

Planes – horizontal, vertical, or combinations

Balance – altered or unbalanced

Positions and formations – changes in single, partner, and group space and floor patterns

Qualities of movement:

Sustained – flowing, continuous movement without stopping

Percussive – sharp movements with stopping and starting

Swings – pendular movements

Collapse – the pull of gravity, as in a falling movement

Vibratory – successive, sharp, and continuous movements

Suspended – a movement held in the air or airborne

Time

Time relates to the speed, duration, flow, musical quality, and rhythm, and moving with musical sensory abilities. See Musical Accompaniment for more information.

Performing

Performing dance is to develop and finely tune the motor activity, senses, emotions, intelligence, creativity, and meaning. It is the ability to duplicate and recall the movements, demonstrate technical skills, and communicate. Thoughts, actions, and emotions blend together. Sample dance themes are abstract, lyrical, dramatic, comic, political, and historical. Student improvisations and performance of choreography are required.

Responding

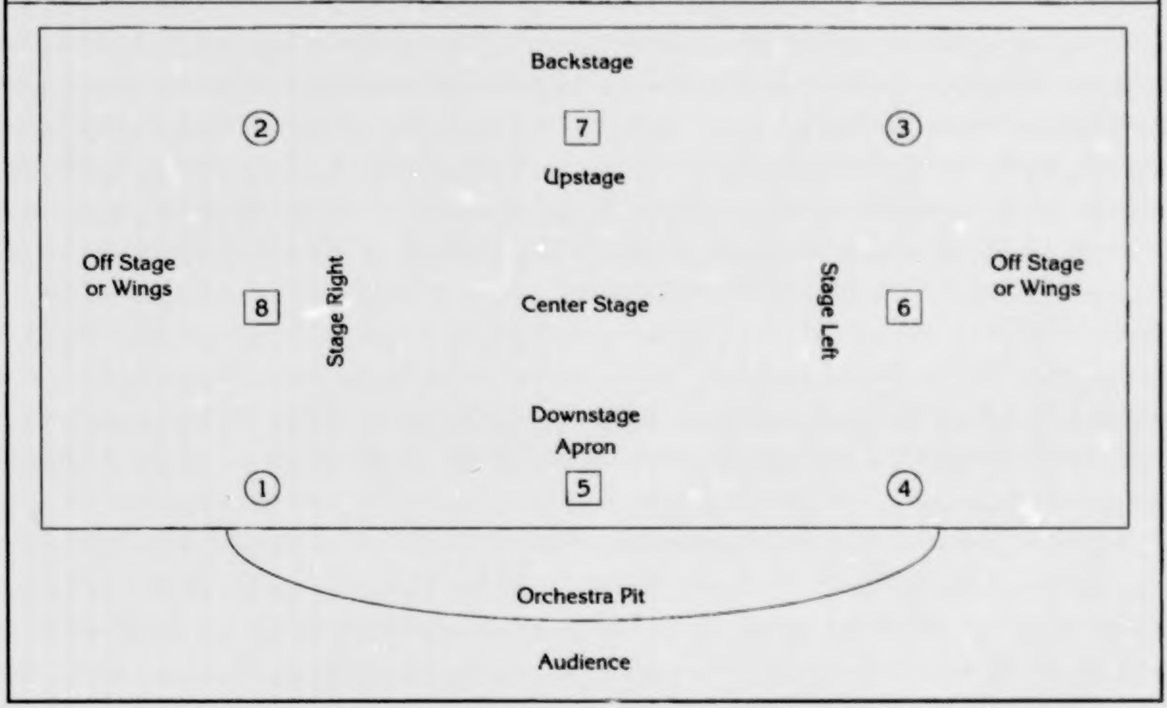
Responding to dance increases observation, critical thinking, viewing, and analyzing skills for the composition, technique, and artistry. Design elements are perceived, identified, and interpreted with the style and meaning. The procedure of applying analyses and artistic judgment for evaluation are connected to this process. Here are suggested peer, self and instructor compositional evaluation criteria:

1. Sets or defines a purpose, idea, or theme
2. Movements are logically organized
3. Possesses a beginning, middle, and ending with high point of interest
4. Presents elements of space, time, and energy
5. Contains appropriate content, movement patterns, and style
6. Shows unity, structure, correct timing, technique, and precision
7. Utilizes suitable accompaniment (if used)
8. Imparts aesthetic value
9. Possesses rhythm, variety, and depth

Stage Floor Classifictions

This is a numbered system for the walls and corners that facilitates directions for class instruction, rehearsals, and written choreography and compositions. Each corner is numbered first, then the walls. The corners are numbered clockwise 1-4 starting with the right corner and proceeds clockwise around the room. The walls are numbered 5-8, starting with the front wall and proceed counterclockwise around the room. Since stages can be any shape, this is shown on a rectangle (see Diagram 1), but is applicable to other shapes. In a dance studio or classroom rehearsal space, you need to understand where the orchestra pit, apron, and

Diagram 1. Stage Floor Numbered System



audiences will be. Upstage is toward the back, downstage is toward the front and center stage is the center of the room. When facing the audience, (the front of the room or mirrors) the dancer's right side is stage right and the dancer's left side is stage left. The wings are offstage to the right and left of the stage area.

Compositional Forms

These are based on professional choreographic structures and are basic formats for student compositional studies.

Motif – smallest complete unit of movement

Chance or Free Form Creative – inspirational improvisation

Symmetry-Asymmetry – balanced and unbalanced form

Abstraction – a gesture or mime movement to reinforce characterization or mood

Transitions – changing from one type movement or sequence to another.

Variation – change to a motif to create contrast and interest

Improvisation – extemporaneous movements performed on a pre-established theme or sequence

Reordering – movement phrases are separated and reconstructed in a different pattern

Two-Part – AB with a beginning and ending

Three-part – ABA has a specific beginning, middle, and repeated beginning sequence, whereas ABC has a specific beginning, middle, and ending sequence

Four-Part – ABCA has a beginning, middle, ending, and repeated beginning, whereas ABCD has a beginning, middle, second middle, and ending sequence and other combinations

Five-Part – ABCDA or other combinations

Cumulative – keeps repeating the beginning step patterns and adding on each time

Theme and Variations – basic movement sequence with changes on basic choreography

Rondo, Round, or ABACADA – groups performing the same composition at different times or returning to the first movement sequence

Chance – free form or sequential creative form that is randomly structured

Fugue – flight and pursuit

Narrative – story is told through words and/or dance

Canon – round or form where the same movement phrase begins at different times except all join in the same movement at the end or coda

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Palindrome – phrase of sequence is performed from the first to second movement and then performed in reverse or retrograde order

Call and Response – a soloist or group performs and second group enters in response

Assessments

Written, oral, and observation instruments assess achievement of the dance education goals and objectives, skills (knowledge and techniques), choreographic elements, and compositional forms. These assessments include peer, self-, and teacher evaluations.

Practice for Improvement

Formulate personal goals and objectives for the dance education classes that involve thinking, feeling, and performing dance. Practice retains the specific sequences in the cognitive and psychomotor learning modes. The affective learning domain affords creativity, evaluation, and reflection. An understanding of design elements contributes to composing dance. For knowledge, skill, and appreciation, include the following:

1. Know the relationship of the body to the elements of space, time, and energy
2. Know the different forms of dance and their history, culture, and purpose
3. Understand the subject matter, story, or theme
4. Characterize the different choreographic processes, principles, and devices employed
5. Know the step patterns and utilize technically correct execution of the skills
6. Participate or help backstage in a dance performance
7. Attend and critique a live dance performance or view a dance on film or video
8. Know how each dance lesson contributes to the dance education standards and curricula
9. Understand your instructor's lesson plan sequence
10. Review, analyze, and interpret the dance composition or choreography.

Safety Concerns

The following recommendations are for an appropriate, safe, and educational dance class. These are procedures for the proper execution of the dance education techniques and experience.

1. Listen carefully, follow directions, and pay attention to precautions and safety tips in class
2. Be open-minded, but do not try a dance technique that is too advanced for your skill level
3. Pay close attention when corrections in dance class are given and adhere to them
4. Participate fully in the warm-up and cooldown dance activities, paying special attention to specific body parts necessary for proper dance participation and reduction of injury
5. Be respectful of others' space and spacing concerns, especially in traveling movements
6. Monitor, calculate, and record heart rates and report inconsistencies or high rates
7. Attend to proper nutrition and rest, an important criterion for any dance activity class
8. Reduce emotional stress with stress reduction techniques or see the school counselor
9. Drink water frequently, bring an unbreakable water bottle to class to use, and increase your water intake when participating in vigorous dance and physical activity classes
10. Know your limitations and avoid extremely stressful dance activities and overuse
11. Notify your instructor of medical conditions, chronic diseases, allergies, injuries, etc.
12. Report any physical discomfort or concerns immediately and discontinue dance classes or performance unless you seek the advice of the school health personnel
13. Adaptive dance activities are available, if requested. If your medical advisor does not recommend full participation, see if partial or limited participation is an option.

Tactics

Challenge, commitment, responsibility, a positive attitude, and focus are elements necessary for mature participation in a dance education class. These strategies benefit the dance experience.

1. Be on time, appropriately attired, and bring the proper dance accessories and shoes
2. Stay motivated and respectful of the instructor and classmates and stay on task
3. Determine the instructor's specific objective of each dance education class

4. Be self-disciplined and concentrate on the dance activity presented
5. Listen to teaching cues and reference them with similar steps and combinations
6. Learn the basic step patterns and sequences for proper technique execution and accuracy
7. Review the combinations mentally and visually to aid in retention and performance
8. Break up difficult steps into parts, practice in isolation, and then practice them all together
9. Pay attention to the musical introduction, sequence, and tempo for timing
10. Understand the musical changes and nuances in relationship to the steps
11. Keep conversations limited and listen carefully during instruction for dance activities
12. Watching and following other students in class while participating is not advised
13. Ask the teacher to demonstrate if you do not understand the sequence or steps
14. Listen carefully to the historical and philosophical content of the choreography
15. Analyze each activity and piece of choreography carefully before performing it
16. Make written notes after class for review and knowledge of corrective dance techniques
17. Read and find out about the choreographer, especially if reconstructing dances
18. Remember that performance is an expressive element that is important for stress relief
19. Enjoy an artistic, safe, and self-fulfilling dance experience!

Resources

Dance education is a lifelong skill for fitness, career development, recreation, entertainment, and self-expression. It offers intellectual and aesthetic stimulation along with physical activity. Many forms are available for different tastes, physical styles, and entertainment requirements. Decide on a dance focus or form, or view a professional dance performance. Participate in and enjoy dance education and performance after school or for intensive career training. Dance career choices include dance performer, therapist, notator, technologist, historian, researcher, educator, and others. Further exposure to the wonderful world of dance awaits you.

Dance Performances in your local area are available. For information, contact civic and professional performing arts groups, local and state arts councils, community and professional theatres, newspaper listings, the Internet, the local Chamber of Commerce, or libraries.

Fine Arts and Magnet High Schools offer dance training and academic programs within the school day. They often have a modern dance emphasis. Contact the local school district office.

Professional Dance Companies, affiliated schools, and dance academies are pre-professional and professional training programs with competitive admissions policies and performance opportunities. Specific dance subjects are emphasized with academic study in boarding and day schools. Some offer intense after-school and apprentice programs. Look in the phone directory.

Private Dance Studios offer specialized training and performance in all forms of dance. Private dance instructors are the primary source of instruction outside of schools. Performance opportunities are recitals and companies. Contact studios with certified teachers (see below).

Dance Certification for dance educators in the public schools is through the state departments of education. University degree programs are listed in the *Dance Directory* (The National Dance Association, *www.aahperd.org/nda)*. Training for private teaching (beginning to professional) is available from societies, organizations, and conservatories. Resources are *Cecchetti Council of America, Royal Academy of Dance, Dance Masters of America*, and *Dance Educators of America.*

Recreational, Civic, and County Recreational Programs may give dance classes as well as YMCAs and YWCAs, fitness clubs, and some health clubs.

After-School Dance Programs and School Dances are dance or drill performance teams, dance clubs, dance honor societies, and after-school dances and proms.

Professional Dance Organizations offer short- and long-term training, workshops, conferences, conventions, and professional development courses by local, state, and national dance councils and organizations. Some offer resources, publications, advocacy, and programs. Contact the *National Dance Association, Dance Notation Bureau*, or *American Dance Therapy Association.*

Regional and Civic Dance Companies offer training, workshops, conferences, and performance with

admission by audition. *The National Association for Regional Ballet* is a resource.

National and Local Dance Clubs are available for education, training, participation, and professional performance opportunities such as square and ballroom dancing. Check the phone directory.

Community Theatres and School Plays offer dance/performance opportunities.

Summer Dance Camps offer training at universities, private studios, organizations, apprentice programs, and private camps. Resources are *American Dance Festival* and *Jacobs Pillow.*

Dance Competitions are sponsored by national groups. This is highly technical dancing and choreography. Specific rules, regulations, and tryouts apply. Check the resources below.

Dance Resources are at the local library, bookstores, the Internet, and video and musical recording stores. Information on dance, history, choreographers, different types of dance, personalities, and dance performance are available. *Pointe, Dance Spirit, Dance Teacher,* and *Dance Magazine* periodicals are available by subscription or at the local or school library.

Scholarships are full, partial, or work scholarships by pre-professional schools, private studios, colleges, universities, and professional companies. Sources are the *Dance Directory* (see above under Dance Certification) and *Stern's Performing Arts Directory.*

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CHAPTER 10

Flag Football

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Introduction

Fascination for football is evidenced by the many programs that exist from the youth league to the professional football conferences. Many individuals cannot participate in organized football programs and are not content in the role of spectator. These men and women are becoming actively involved in some form of recreational football. Recreational leagues range from flag or tag football teams for men and women to programs involving coed flag football competition. Recreational programs in cities, high schools, and colleges have utilized the rules and strategies of regulation football, flag football, and tag football. These modifications allow the game to be safe, enjoyable, and competitive for the participants.

Flag football is an activity that can be included in the physical education curriculum. Basic skills and strategies can be introduced at the elementary level and culminate with the more advanced skills and strategies at the high school level.

A flag football team is composed of eight participants (four men and four women), although the game can be modified to accommodate from six to ten players. The playing field (40 x 100 yards) has four 20-yard zones and 10-yard end zones. Scoring takes place by a touchdown (6 points), conversion (run or kick—1 point), safety (2 points), or field goal (3 points). The ball is advanced by running or passing, although some modifications are stipulated in the rules. Progress of the player in possession of the ball is stopped by pulling off one of the flags attached to a belt worn around the waist.

All the skills and strategies of regulation football, minus the contact, are utilized, making flag football a fun, challenging, and physically demanding activity.

Terminology

Center. The offensive lineman/woman who snaps the football to the quarterback.

Defense. The team that does not have possession of the football.

Fake. A move made by a player for the purpose of deceiving an opponent.

Field Goal. A three-point score when the football is kicked from a place kick over the crossbar and between the uprights.

First Down. The first of four attempts to move the football forward into the next 20-yard zone or end zone.

Forward Pass. A pass thrown from behind the line of scrimmage toward the opponent's goal line.

Handoff. An exchange of the football from the quarterback to a teammate.

Offense. The team that has possession of the football.

Offside. Movement across the established line of scrimmage before the football is snapped.

Safety. An offensive player in possession of the football is downed in own end zone (2 points).

Screen (Block). An offensive player positioning the body between an opponent and the ball carrier.

Scrimmage Line. Imaginary line drawn from forward tip of the football to the sidelines.

Touchdown. An offensive player having possession of the football in opponent's end zone.

Skills and Techniques

Offensive and Defensive Stance

In the game of flag football, blocking (physical contact) is not permitted in the rules; therefore, the priority is

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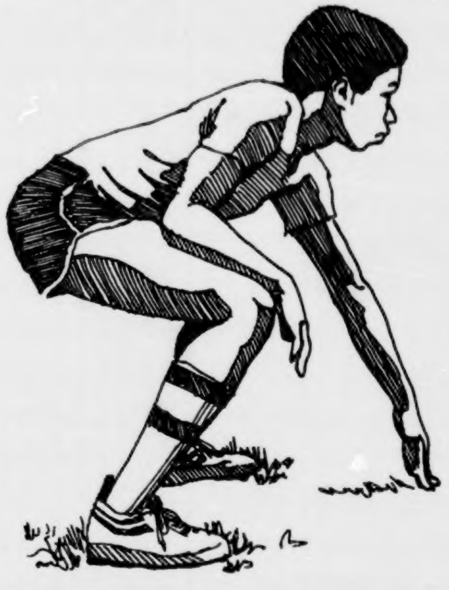
not on physical strength but on quickness. On signal, the responsibility of the offensive lineman/woman is to move quickly and screen for a teammate, whether it be for a run or pass play. (A screen is a player maintaining a position, without use of contact, between a defender and the ball carrier. The arms and elbows of the screener must remain in contact with his/her body). The defender must be adept in quickness and control and must attempt to move around the screen and rush the quarterback or ball carrier.

Because the quick, controlled movements when the ball is snapped are essential qualities for both the offensive and defensive lineman/woman, the stance used by each is quite similar. If a three-point stance is used, place the feet shoulder width apart, reach forward, and rest one hand on the ground. Raise the posterior so the back is nearly parallel to the ground and rest the free arm on the leg above the knee. To ensure balance, the weight should be equally distributed on the feet and the hand, with the head raised and the focus forward (see Figure 1).

A three-point stance is not specified in the rules; therefore, it is acceptable for the lineman/woman to be positioned on the line with the knees flexed and the hands resting on the legs just above the knees. The rule enforced is that the offensive lineman/woman must be motionless prior to the snap. However, this rule does not apply to the defensive lineman/woman.

Figure 1. Three-point Stance



Points of Emphasis

Three-Point Stance

- Feet parallel, shoulder width apart
- Knees flexed
- Arm extended forward, hand on ground
- Weight evenly balanced on feet and hand
- Back parallel to ground
- Head raised, focus ahead

Two-Point Stance

- Feet parallel, shoulder width apart
- Knees flexed
- Hands resting on top of thigh above knee
- Weight evenly balanced on feet
- Back parallel to ground
- Head raised, focus ahead

Centering and Receiving

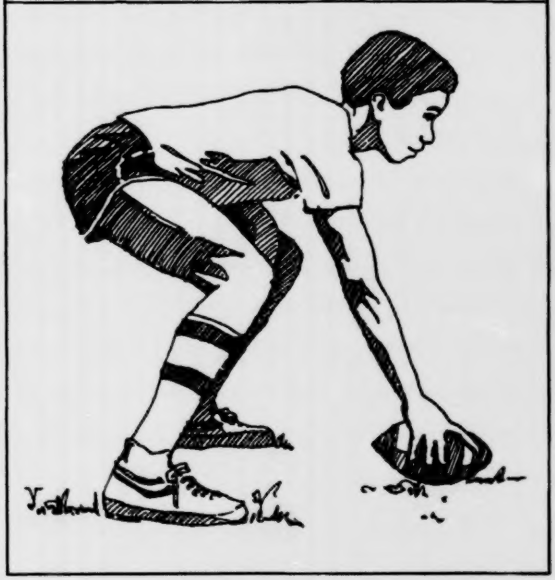
Before offensive play can take place, the ball must be exchanged between the center and the quarterback. This is done either by positioning the quarterback directly behind the center or in a shotgun formation 10 to 15 feet behind the center. Because flag football is primarily a passing game, most teams utilize the shotgun formation in that it gets the ball deep into the backfield and the decision to pass or run is made easier. If the direct exchange is used, the center assumes the three-point stance, focuses forward, and grips the ball in the same manner as for the throw (Figure 2). With a secure grip, the ball resting on the ground, and the nose of the ball pointing forward, the center sweeps the arm straight back and up between the legs. As the ball is being swept back, the center rotates the ball one-quarter turn so the ball can be placed securely into the hands of the quarterback. It is most important that the swing of the arm and the rotation of the football be executed simultaneously.

In order that the quarterback may receive the ball, a pocket must be formed by placing the heels of both hands together, spreading the fingers, and placing the throwing hand on top.

Both hands are positioned under the center, with the back of the top hand pressed against the buttocks of the center. With the knees bent and feet parallel and shoulder width apart, the quarterback calls the signal for the exchange. Movement away from the center should not occur until the ball has been exchanged.

If the shotgun is used, the center widens the stance, looks at the target, and, eliminating the one-quarter

Figure 2. Centering the Ball



turn, spirals the ball back to the quarterback.

Points of Emphasis
Direct Snap

- Assume three-point stance
- Ball resting on ground, nose pointing downfield
- Grip football same as for throw
- Swing extended arm back and up between legs
- Rotate ball one-quarter turn during swing
- Snap ball into quarterback's hands
- Snapper's palm faces quarterback's hands
- Focus ahead

Long Snap

- Widen stance
- Drop head, look at quarterback's target
- Snap ball directly back to quarterback
- Utilize forceful underhand toss
- Spiral ball to quarterback

Receiving Direct Snap

- Quarterback directly behind snapper
- Feet shoulder width apart, knees bent
- Heels of hands together, hands and fingers spread
- Rotate hands, throwing hand on top
- Back of top hand pressed against snapper's buttocks

Handoff and Pitchout

After receiving the snap, the quarterback performs an exchange (handoff) with the backfield player. The backfield player, preparing to receive the ball, raises the arm nearest the quarterback to chest level. This near arm must be parallel to the ground with the open hand facing down. The far arm, also parallel to the ground, is across the waist with the palm up. As the ball is placed in the stomach, quickly close the hands on the football and then put the football into the carrying position prior to running down field.

If the play is designed as a pitchout, the quarterback places the hands under the football and tosses the football underhand to the backfield player. Toss the football so it is received at chest level. The backfield player must concentrate on the football until it is caught in the hands and then tucks it into the body.

Points of Emphasis
Receiving Handoff

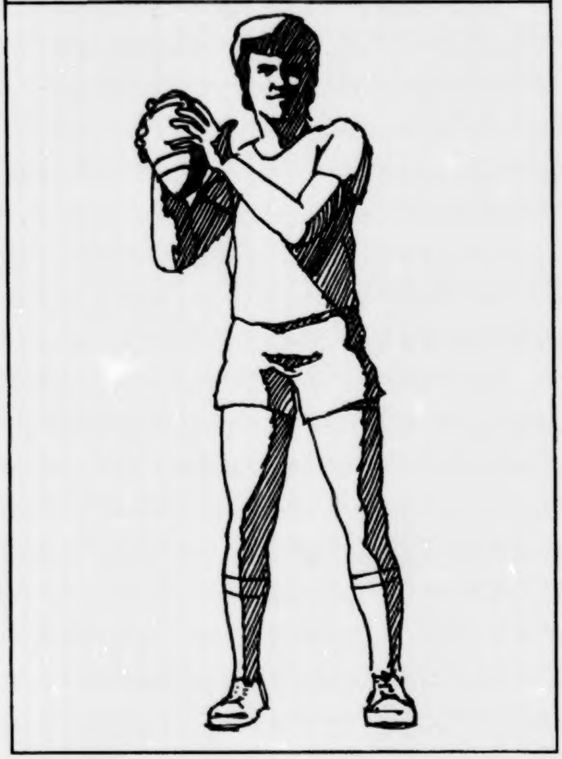
- Raise arm closest to quarterback to chest height
- Top arm is parallel to ground, palm down
- Bottom arm is at waist height
- Bottom arm is parallel to top arm, palm up
- Close hands around ball when placed into stomach

Grip and Passing

Before the football is passed, it must be securely gripped in the throwing hand with the thumb and the index finger comfortably spread. Place the thumb and index finger on the circle of the football, with the remaining fingers placed on the laces.

The nonthrowing hand presses the football into the throwing hand, and both hands assist in raising the football to ear level (Figure 3). As the football continues to be brought back behind the shoulder, the shoulders and body rotate so the nonthrowing side of the body is facing the direction of the pass. When the nonthrowing hand can no longer remain in contact with the football, it should be extended in the direction of the intended flight of the football. The rear foot (plant foot), bearing the majority of the weight, initiates the throw by transferring weight onto the forward foot, which is pointing in the intended direction of the pass. As the weight is being transferred, the hips and shoulders unwind, resulting in the chest facing the intended target. The throwing arm, led by the elbow, is whipped forward over the shoulder. As the arm is extended, the wrist and fingers snap downward on the release.

Figure 3. The Grip



This imparts a spiral to the ball. Follow through by extending the throwing arm in the intended direction of the pass and, after releasing the ball, draw the arm downward to the nonthrowing side. The throw is completed with the weight on the forward foot and the passer concentrating on the target of the throw.

Points of Emphasis

Grip

- Fingers relaxed, comfortably spaced
- Thumb and index finger on circle of football
- Fingers 3, 4, 5 placed on laces

Passing

- Nonthrowing hand presses football in the throwing hand
- Raise football to ear level
- Rotate shoulders and body back
- Football behind shoulder, elbow shoulder height
- Nonthrowing hand pointing in pass direction
- Weight on rear foot
- Transfer weight to front foot
- Whip throwing arm forward and over the shoulder
- Extend throwing arm, snap wrist and fingers on release

Cutting, Receiving, and Carrying

Before receiving a pass, the offensive player must maneuver into an open area. This can be accomplished by running a predetermined pass pattern that allows you to free yourself from the defender. The quick change of direction (cut) needed to put yourself into an unguarded position is executed by pushing off the inside of the foot that is on the opposite side of the intended cut. Therefore, if a player wants to cut to the right, the push is off the inside of the left foot. This cut can be made easier by running at a controlled speed, taking short steps, and lowering the body by bending the knees. After the cut has been mastered, a fake, which can be done with the head and/or shoulders, should be incorporated into the movement. Once the cut is made into an open area, turn, face the quarterback, and concentrate on the flight of the football. This concentration must continue until the football rests in the hands of the receiver.

As the pass approaches, extend both arms, with the palms facing the football and the thumbs pointing inward. Spread and relax the fingers, and, when contact occurs, give with both the arms and fingers and pull the football into the body. If the pass is thrown below the waist, the fingertips are pointing down and the little fingers are facing inward. Once the football is in the possession of the receiver, and before running, put it into the carrying position by spreading and extending the fingers over its point.

The football is then tucked into the crook of the elbow and held tightly against the body (see Figure 4). Moving downfield, the ball carrier must combine speed, quick cuts, and pivots to prevent removal of a flag. Because contact is not permitted in flag football, utilizing teammates for screening purposes is a strategy that must be incorporated into the offense.

Points of Emphasis

Cutting

- Push off inside of foot, using foot opposite side of intended direction
- To cut right, push off left foot
- To cut left, push off right foot
- Take short steps, bend knees

Receiving the Pass

- Turn and face quarterback

- Extend arms, palms facing football
- Point thumbs inward, spread and relax fingers
- On contact, give with the catch
- Pull football into the body

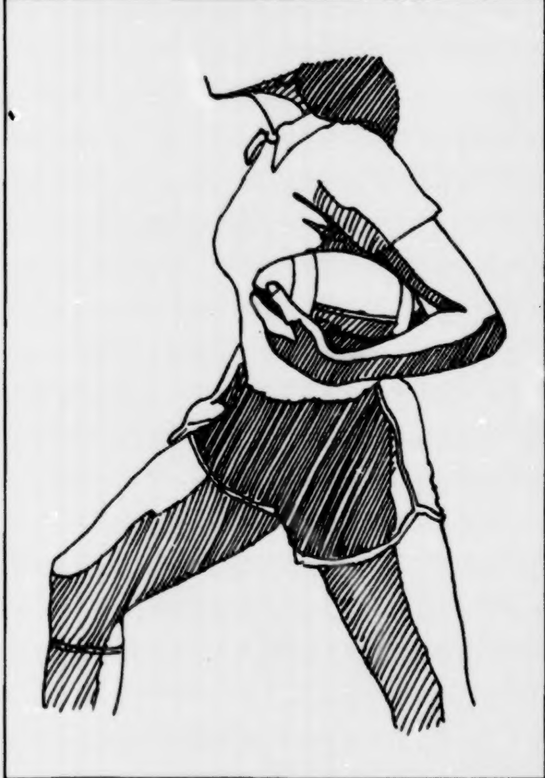
Carrying the Football

- Spread fingers and cover tip of football
- Tuck opposite end of football into crook of elbow
- Pull arm tightly into body

Punting

When a team fails to advance the designated distance for a first down or score, one of the options available to the offense is punting the football. In flag football, rushing the kicker is not allowed; therefore, complete concentration should be on the execution of the punt. After receiving the football, the punter rotates it so the laces are on top. With hands on either side of the football, extend both arms forward and simultaneously take one short step onto the kicking foot, followed by a normal step onto the support foot. As the kicking foot swings forward, drop the football, enabling contact to occur on the upswing. Contact, with a firm ankle and the toe pointing down, is made on the instep of the foot at approximately 18" to 24" off the ground. Maximum distance is achieved by a full extension of the kicking leg with the follow-through continuing to shoulder height. When the support foot leaves the ground, extend both arms to the side to ensure balance and control.

Figure 4. The Carry



Points of Emphasis
Punting

- Grip ball, hands on either side
- Extend arms forward, waist height
- Take two steps, first step is onto kicking foot
- After second step, drop football, swing leg forward
- Firm ankle, point toes down
- Contact ball with instep
- Extend kicking leg in direction of punt
- Follow through with leg to shoulder height

Place Kick

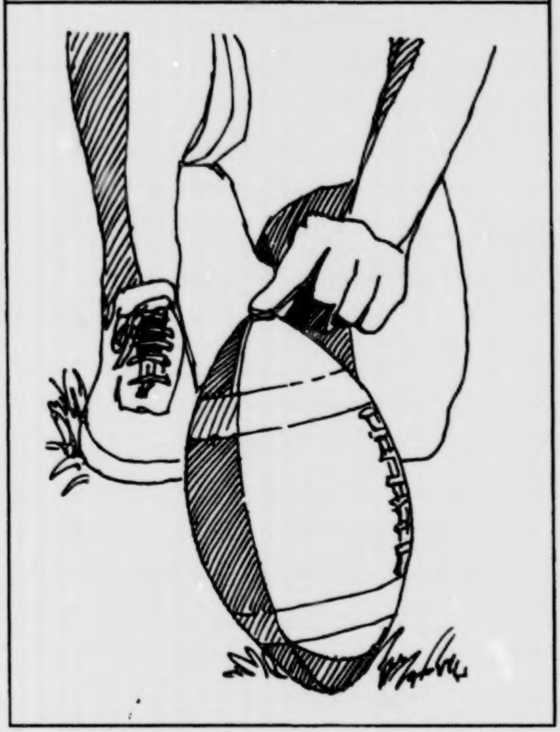
In most instances, place kicking in flag football (kickoff, field goal) is done without a tee; therefore, the mechanics for the kick-off and field goal attempts are similar. After the holder receives the football, the laces are turned forward, and it is placed on the ground tilted back slightly (see Figure 5).

The kicker, with the head down, approaches the football and focuses on a spot below the center where contact must occur. The support foot, pointing in the direction of the kick, is planted to the side and slightly to the rear of the football. As the kicking leg is brought forward, the knee is bent and the ankle is flexed and firm. The swing of the leg must be forceful, with full extension forward and upward, using the arms to aid in maintaining balance.

Points of Emphasis
Place Kick

- Kicker focuses on spot for contact
- Plant nonkicking foot to the side and rear of football
- Point nonkicking foot in direction of kick
- Kicking leg is swung forward, knee bent
- Firm and flex ankle
- Swing leg from the hip
- Fully extend leg forward and upward

Figure 5. Place Kick



Safety

Due to the game's structure, the outdoor setting, and the variety of weather conditions under which the game is played, numerous injuries occur in flag football. Many of the sprains and strains can be prevented by an adequate amount of time spent warming up prior to participation.

Improper techniques of running, throwing, catching, and kicking result in injuries to ankles, fingers, elbows, and shoulders, but injuries can be prevented by proper teaching and coaching.

Too often, more serious injuries occur as a result of collisions due to one or more participants playing in an uncontrolled manner. A player unable to stop, turn, or change direction quickly can be a hazard to other participants; therefore, the no-contact rule must be strictly enforced. The individual supervising or officiating the activity must not allow the participants to confuse flag football with regulation football, where the participant has the benefit of protective equipment.

Acceptable playing conditions, adequate warm-up, proper technique, good coaching, and responsible officiating contribute to safe and enjoyable participation in this activity.

Strategy

Offense

Because the game of flag football is primarily a passing game, the offensive strategy should be composed of a variety of passing plays with running options available (see Diagram 1).

Basically, the offensive skills most essential for success in advancing the football are throwing, catching, and open field running. A variety of options should be incorporated into the strategy because everyone is eligible to run, throw, and receive the football, except in situations as specified in the rules. The limitation on the number of forward passes that a male quarterback may throw emphasizes the need for skilled quarterbacks. It is also important that the offensive line people are agile and skilled in executing screens preventing the rushing defensive players from getting to the quarterback.

Diagram 1. Passing Formations

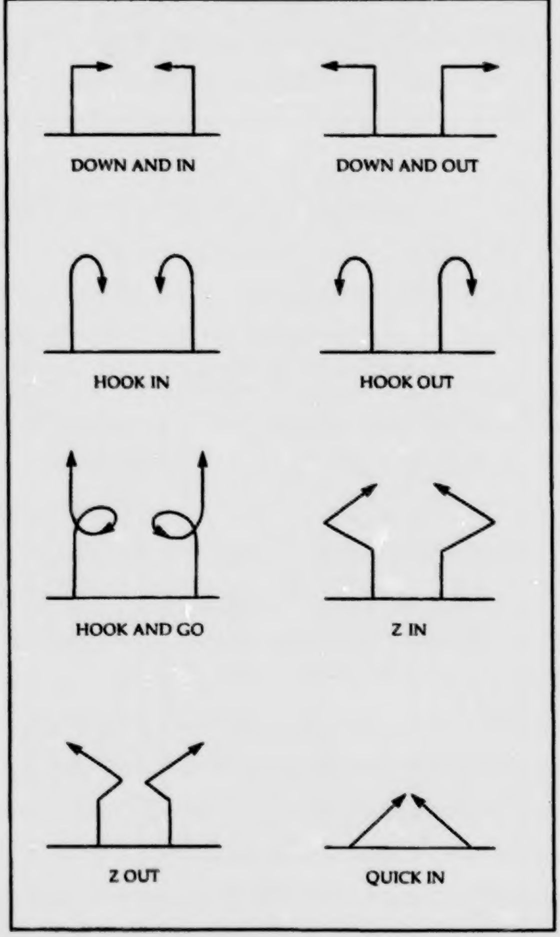
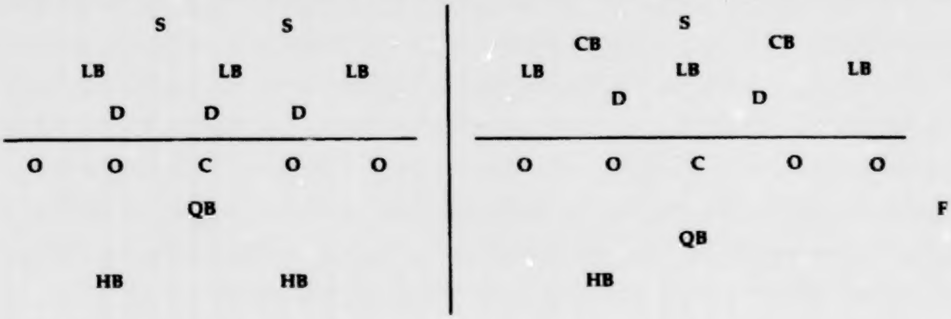


Diagram 2. Offensive and Defensive Formations



Offense
C–Center; O–Offensive Line Player; QB–Quarterback; HB–Halfback; F–Flanker

Defense
D–Defensive Line Player; LB–Linebacker; CB–Corner Back; S–Safety

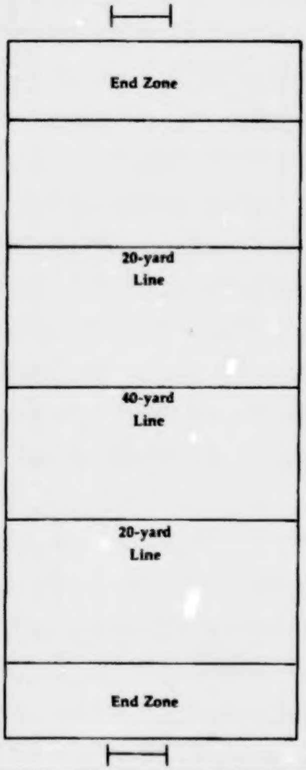
Defense

The defensive strategy in the game of flag football is to pressure the quarterback and prevent the ball from being advanced via the run or pass. This pressure is the responsibility of the defensive linemen/women who must evade the opponent's screen, contain the quarterback, and remove one flag before a pass can be attempted. While the quarterback is being subjected to this pressure, the linebackers and cornerbacks must remain with their assigned opponent. Usually, person for person coverage is used in flag football. Each defender must constantly maintain a position between the opponent and the goal line. If an opponent does gain possession of the football, a flag must be quickly removed. This can be accomplished by the defender moving toward the opponent, focusing on the waist, and reaching out and quickly pulling a flag from the belt. As soon as the flag is removed, the defender immediately raises the flag above the head so that the official and players are aware that play has stopped. See Diagram 2 for several examples of offensive and defensive formations.

Flag Football Rules

1. Team: Eight players, four men and four women, shall constitute a team.
2. Field: The playing field shall be 100 yards long and 40 yards wide. There shall be a 10-yard end zone at each end of the field. Goalposts will be placed on the back line of the end zone. The field shall be marked by lines dividing the field into four 20-yard zones. The inbounds line shall be 10 yards from the sidelines (see Diagram 3).

Diagram 3. Playing Field



3. Time: The game shall be played in halves of 20 minutes each. Teams will switch ends of field at halftime only. The rest period shall be 5 minutes at the half. Each captain may call one time-out (1 minute) each half.
4. Start of Game: The team captain winning the coin toss may elect one of the following: kick, receive, or goal to defend during the first half. At the start of the second half, teams will reverse field positions, and the team who kicked off at the start of the game will receive.
5. Kick-off: The kick-off shall be made from the kicking team's 20-yard line. It must be a place kick, and the ball cannot be teed up in any manner. The receiving team must position five players on the midfield line. The kick must travel 20 yards before becoming a free ball.
6. Scrimmage Plays: Prior to start of play, the offensive team must come to a "set" position for one second. One player only may be in motion but cannot be moving toward the scrimmage line. Advancement via the run from behind the line of scrimmage is restricted to females only. There are no advancement restrictions for a male once he has obtained possession of the ball beyond the line of scrimmage.
7. First Downs: A team shall be allowed four downs to advance the ball across each zone line (20 yards apart). Each time a team advances the ball across a line, it is awarded a first down and will be allowed four more downs to make the next zone line. Upon a change of team possession, the line to gain shall be that line immediately downfield from the spot where the ball becomes dead.
8. Detached Flag: The ball becomes dead when the ball carrier's flag becomes detached from the flag belt. The ball carrier cannot use hands or clothing to prevent opponents from pulling the flag.
9. Blocking: No blocking is permitted. Offensive players may screen for the ball carrier by keeping both arms in contact with their body and moving laterally into the path of an opponent. No contact is permitted.
10. Passing: All forward passes must be thrown from a point behind the line of scrimmage. Restrictions on use of forward pass:
    a. During a 4-down series, males are restricted to only one forward pass attempt. If the down in which the pass was attempted is repeated because of a penalty, or if a new series begins, he may again attempt one pass in the series.
    b. Male pass receivers must receive all forward passes beyond the line of scrimmage.
    c. There are no restrictions on female passing or pass-receiving.
11. Fumbles: All fumbles may be recovered by either team, but only the offensive team may advance the ball following a recovery.
12. Dead ball: The ball becomes dead when:
    a. The ball carrier's flag becomes detached from the flag belt (pulled or falls off).
    b. When any part of the ball carrier's body other than the hands and feet touch the ground.
    c. Following an incomplete forward pass.
    d. Following recovery of a fumble by the defensive team.
    e. When the ball goes out of bounds.
13. Kicking: When the offensive team elects to kick, it must call the play "kick." No player on either team may cross the line of scrimmage until the ball has been kicked. A punt or kick-off may be made by either sex, but advancement of the ball from either of these two techniques is restricted by the following: Male punt or kick-off receiver—cannot advance the ball forward from his point of contact with the ball; he may, however, move backwards or perpendicular to that first point of contact. Advancement is only possible by a female ball carrier.
14. Scoring
    - Touchdown: 6 points—Try after touchdown—1 point (kick or run).
    - Field Goal: 3 points—Team must announce intention to attempt a field goal. Neither offensive nor defensive players may cross the scrimmage line until the ball has been kicked. The kick must be made from a spot directly behind the point from which the ball is centered. The ball shall not be teed up in any manner for placement attempts.
    - Safety: 2 points—A safety results when the offensive team is responsible for grounding the ball behind its own goal line.

15. Substitutions: Unlimited substitution is permitted.
16. Equipmen: Plastic- or metal-spiked and cleated shoes are prohibited. Sneakers or shoes with molded rubber cleats are permitted. Players may not wear any device that might cause injury to other participants. Two flags, attached to the flag belt in a proper manner, shall be worn by all players.
17. Tie Games: If, at the conclusion of the second half, teams are tied in score, the team with the most first downs will be declared the winner. If teams are tied in score and first downs, an overtime series of plays will be run. The ball shall be placed on the midfield line, and one team will start a series of four downs (choice of first offensive series by toss of coin). Team A (offense) will attempt to advance the ball as far as possible into Team B's territory in four consecutive downs. Team B will then take over the ball at the point where Team A's series ended. The position of the ball at the conclusion of Team B's four downs will determine the winner. If the ball is in Team A's territory, then Team B is the winner. An interception or recovery of a fumble by opponents will terminate a team's series of downs. The recovering team will start play from the point where the recovery was made or the interception run-back ends. No punting or field goal attempts are permitted in the overtime series.
18. Penalties
    - Offside: 5 yards.
    - Illegal motion: 5 yards.
    - Intentionally grounding ball: Loss of down and 5 yards from spot of pass.
    - Illegal forward pass: Loss of down and 5 yards from spot of pass.
    - Illegal advancement by male: 5 yards from line of scrimmage and loss of down. — 5 yards from spot of illegal advancement on punt or kickoff.
    - Illegal wearing or protecting of flag: 15 yards.
    - Unnecessary roughness: 15 yards and disqualification of player.
    - Defensive pass interference: Offensive team ball at point of foul—automatic recorded first down.
    - Offensive pass interference: 15 yards and loss of down.

Equipment

Footballs

The size of the football selected for play is dependent upon the age level participating in the activity. What must be taken into consideration is the fact that the game involves women throwing and catching the football; therefore, the size of the football is of prime consideration. A youth-size ball should be considered for the younger participants, whereas an intermediate size is more appropriate on the high school and college level.

A rubber-covered football is more durable for teaching, intramural, and recreational situations, whereas a leather-covered football (which is more expensive) may be more appropriate for competitive situations.

Flags and Belts

Consideration must be carefully given to the selection of flags and belts. Regardless of the type of closure, rings or Velcro, the belt should be easily adjusted as needed by the participants. The most functional attachment of flags to the belt seems to be with Velcro on flags and belt. Although the most common material used in the construction of flags and belt is a flexible plastic, a heavy canvas fabric that seems to be the most durable is also available from some companies.

It should also be pointed out that strips of any durable fabric can be tucked into waistbands of gym shorts or warm-up suits, allowing the game of flag football to be introduced without an expensive investment in equipment.

Down Marker

Although official down markers are available, a plastic pylon, 36" in height, can also be used. In situations where first downs are determined by crossing into a designated zone, the pylon, with the downs painted around the side, is all that is needed.

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CHAPTER

Floor Hockey

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Introduction

Floor hockey is a fast-moving team sport that resembles the game of ice hockey in many ways. There are, however, several differences between the two games, and it is largely because of these differences that par-ticipants of all ages can quickly learn to play and enjoy the game of floor hockey. The primary difference, of course, is the fact that floor hockey can be played in a gymnasium of almost any size, provided that there is enough room for the players to move around safely. Floor hockey does not share ice hockey's need for an ice arena or ice skating ability of the players. In addition, the equipment used in floor hockey is somewhat different from that used in ice hockey. Floor hockey is generally played with either a plastic or wood and plastic stick and either a plastic puck or small ball. Another major difference between floor hockey and ice hockey is the fact that floor hockey is not a body contact sport.

After basic instruction primarily concerned with control of the stick, the puck, and the body, the players can enjoy participation in the exciting game of floor hockey. Because floor hockey is a novel activity to many individuals, carefully planned instruction must occur not only for students to master the skills necessary to play the game but also so that students can play the game safely. Teachers should plan lessons carefully so that students can master the beginning skills prior to the more advanced skills and prior to playing the game. Carefully planned progressions should be utilized in the instructional unit.

It is very important to master control of the stick prior to competition in floor hockey. It is simply too dangerous to allow a student to play the game when the stick cannot be kept low and away from the bodies of other players. Therefore, teachers must be consistent in calling penalties for rule violations and taking measures to reduce the likelihood of physical injury by the actions of players. Likewise, teachers are encouraged to make modifications when it can be determined that such modifications will increase the likelihood of student success and/or decrease the likelihood of injury.

Terminology

Backhand Shot. A type of shot, either with or without a backswing, in which the puck is propelled from the opposite side of the stick from which the wrist shot and slap shot are taken (i.e., the nonpreferred side).

Body Checking. An illegal physical action where the player uses the body to bump or push an opponent.

Center. The forward player who is positioned between the two other forwards and who participates in each face-off.

Defense. The team that does not have possession of the puck.

Defense Person. One of the two players who are positioned behind the three forwards and in front of the goalie.

Face-Off. The action that begins play at the start of the game and after any other stoppage in play where the referee drops the puck between the sticks of the two centers as the stick blades are positioned with the points of the blades opposite each other and approximately 6" to 10" apart. The two players must allow the puck to drop to the floor before making contact with the puck.

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Goal. The mesh-covered, metal frame device into which players attempt to score.

Goalie. The player who stands in front of the goal to prevent the opponents from scoring.

High Sticking. An illegal action where the player raises the stick above waist height.

Holding. An illegal action where the player impedes or attempts to impede the progress of an opponent by use of the hands or other body parts.

Hooking. An illegal action where the player impedes or attempts to impede the progress of an opponent by the use of the stick.

Offense. The team that has possession of the puck.

Offside. A player is offside if both feet have crossed the opponents' blue line prior to the puck crossing the blue line. (Also see Two Line Pass.)

Pass. The action with the stick that sends the puck from one player to another.

Score. One point is scored when the puck completely crosses the goal line.

Slap Shot. A type of shot with a backswing in which the puck is propelled by a quick slap with the stick.

Slashing. An illegal action where the player uses the stick to swing at or in the direction of an opponent.

Tripping. An illegal action with the stick or the body that disrupts the feet or legs of an opponent and causes the opponent to fall to the floor.

Two Line Pass. This type of illegal pass from one player to a teammate is one that crosses any two of the three floor lines, which include the centerline and the two blue lines. (Also see Offside.)

Winger. The forward players who are positioned to the right and left of the center.

Wrist Shot. A type of shot with no backswing in which the puck is propelled by a quick flick of the wrists.

Skills and Techniques

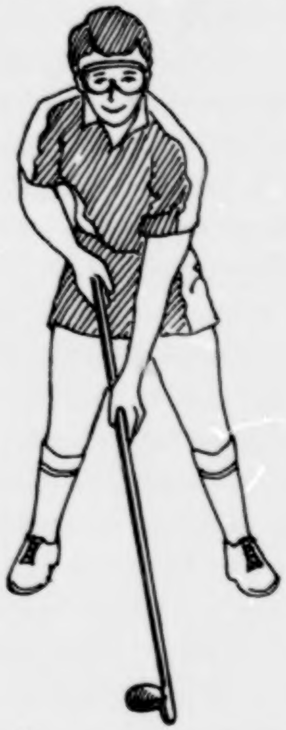
Several skills must be learned before a player is able to play the game of floor hockey in a safe and successful manner. They include gripping the stick, stick handling (sometimes referred to as dribbling), passing, and shooting. This section explains the key elements related to each of the basic skills in the game of floor hockey.

The Grip

Most players will have a preference regarding whether the right hand or left hand is at the top of the stick. If the right hand is at the top of the stick and the left hand is below it, the player is said to shoot left; if the left hand is at the top of the stick and the right hand is below it, the player is said to shoot right. A player should try both hand positionings before determining which one is preferred. Normally, one will quite simply "feel" better than the other. The important principle to remember concerning the grip is to be sure that the hands are not placed too closely together. A floor hockey stick is not used as a golf club is used and therefore should not be gripped the same. If the hands are placed together near the top of the stick as they are in holding a golf club, there is a tendency to swing the floor hockey stick in a golf club-like manner. This is extremely dangerous and must be avoided (see Figure 1.)

The bottom hand should be placed at a comfortable distance down the stick away from the top hand. This distance will vary somewhat depending upon the length of the stick and the size of the player; however, a good guide to use is to place the lower hand somewhere from slightly more than one-third to slightly less than halfway down the stick. This enables the player to maintain good control of the stick by keeping it low while pass-

Figure 1. The Grip



ing and shooting as well as maintaining good control of the puck while stick handling, passing, and shooting.

The top hand should be placed at the extreme top of the stick so as not to leave several inches of stick above the hand. Exposed stick above the top hand not only makes a stick more difficult to control but also creates a danger to other players who might get jabbed with this portion of the stick. If the player cannot maintain his or her grasp at the top of the stick, then the stick is probably too long for that player. Both hands are placed on the stick in the "handshake" position, that is, with the stick being held across the palms from the base of the index fingers to the heels of the hands below the fifth fingers and between the "V" formed by the index fingers and the thumbs. The fingers should maintain a firm but not rigid grasp of the stick. Likewise, the wrists should be firm but not so rigid that they cannot rotate when passing and shooting. Finally, players should be taught to, whenever possible, keep both hands on the stick to maintain optimum control of the stick.

Stick Handling

Stick handling, sometimes referred to as dribbling, is the technique used to move down the floor with possession of the puck. Stick handling is performed best with both hands on the stick in the proper position. The puck is kept directly in front of the body and is pushed down the floor in front of the player's body. Often the player will tap the puck, using alternate sides of the stick, in an attempt to elude an opponent who might be approaching.

With this maneuver, the stick handler can decide to make a quick move to the right or to the left in an attempt to get by the opponent. While stick handling, it is important to flex the knees comfortably and to bend slightly forward at the waist, but not so much that the player is leaning over. The bottom hand on the stick is almost straight at the elbow while the top hand is bent at approximately 90 degrees at the elbow. With the hands and arms in this position, the puck can be appropriately controlled in front of the body.

It is also important to remember that the best stick handlers are able to advance the puck by keeping the head and eyes up to determine the direction in which they want to proceed. By looking down at the puck excessively, the stick handler is unable to know where approaching defenders are located, where the opponents' goal is located, and where fellow teammates are located in the event that a pass might be required. It is also more dangerous to stick handle with the head and eyes down because the likelihood of a collision is increased. Therefore, although most players will need to look down at the puck to some extent to successfully maintain control of it, players should practice keeping the head and eyes up as much as possible. Players should remember that it is possible to look several feet in front of the puck and still see the puck with one's peripheral vision.

Practice Drills: Stick Handling

1. Practice walking down the length of the floor with the puck positioned a stick's length in front of the body. Tap the puck alternately with each side of the stick while walking.
2. Stick handle the puck down the length of the floor while jogging slowly.
3. Stick handle the puck down the floor while varying the speed with which the body moves.
4. Stick handle the puck down the length of the floor without looking directly at the puck. Look down the floor several feet in front of the puck.
5. Stick handle the puck while walking through a maze of plastic cones. As control of the puck increases, the player can increase speed (see Diagram 1).
6. Stick handle the puck through a maze of plastic cones that are spread at irregular distances. As control of the puck increases, the player can increase speed (see Diagram 2).

Passing

Passing is the skill used to send the puck from one player to another. Actually, the skill of passing consists of two phases: (1) originating the pass by directing the puck to a teammate and (2) completing the pass by receiving the puck from a teammate.

Originating the Pass

The puck can be passed to a teammate from either side of the stick's blade; however, many players will find it easier to control the puck if it is passed from the regular shooting side of the blade. For a left-handed shooter (left hand on the bottom, right hand on top), this is the right side of the blade as one looks down at the stick. For a right-handed shooter, it is the opposite. Players should practice passing the puck from either side of the stick due to the fact that in a game, one cannot always turn to position the body so that the puck can be passed from the favored side of the stick. Furthermore, when teammates are rapidly advancing

Diagram 1. Practice Drill Configuration

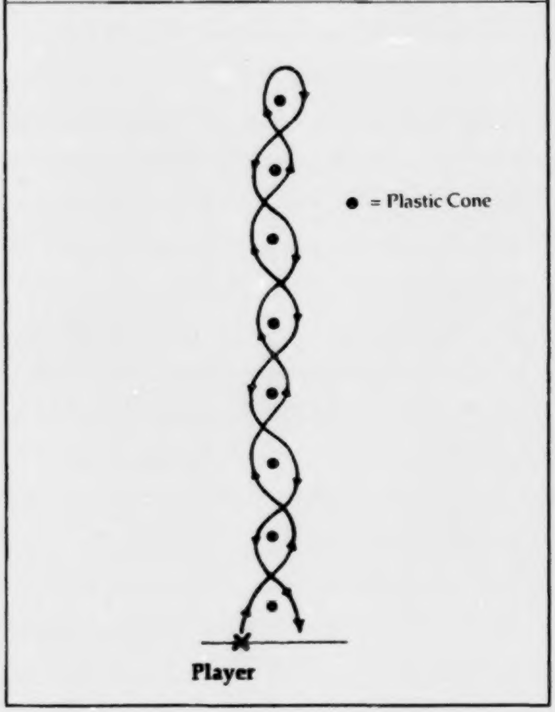
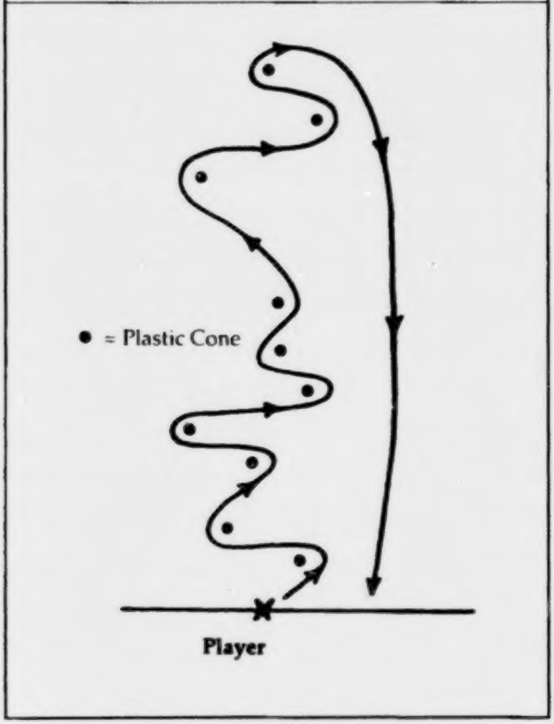


Diagram 2. Practice Drill Configuration



the puck down the floor against the opponents, there is no time to change body positions. The puck must simply be directed to the teammate from whichever side of the blade is nearer the teammate. In other words, if the pass is to be directed to the left, then this quick action is performed with the left side of the stick; conversely, if the pass is to be directed to a teammate to the right of the player with the puck, then the right side of the stick is preferred.

Generally, the shorter the pass, the greater the accuracy. Players should be encouraged to execute short, quick passes in an attempt to maintain control of the puck. Although longer passes are sometimes in order, these are more difficult to execute and often lead to interceptions by the opponents.

The pass can be initiated by either having the blade of the stick already in contact with the puck or with a short, low backswing of a few inches. Players should be cautioned not to take a long or high backswing, however, since this action, in addition to being dangerous, might result in a puck that is passed so hard it is difficult for the teammate to receive. If the pass is executed from a stationary position, the passer should assume a balanced stance with the feet at least shoulder width apart. The knees should be flexed slightly, and the player should bend forward slightly at the waist.

For beginners, it is easiest to learn passing by positioning the body so that the passer is standing sideways to the target. However, with calculated control of the stick, the passer should be able to pass the puck to various teammates who are either to the side or somewhere in front of the passer. The adjustment needed is simply executed by altering the position of the body in relation to the puck by either moving the feet, moving the stick, or both.

The puck, as previously mentioned, can be passed using either side of the stick, depending upon the location of the receiver. The important point to remember in order to execute an accurate pass is that the blade of the stick must be pointing in the exact direction of the receiver. This angle can be changed by moving the entire body, by adjusting the position of the feet, or simply by changing the position of the stick by altering the position of the arms. Even the wrists can assist the player in making changes to the direction that the stick is pointing.

The passer should shift the body weight by stepping toward the receiver. If a left-handed passer is passing the puck to the right of the midline of the body, the

passer should step toward the intended target with the right foot. If the pass is being executed using the backhand side of the stick and passing to the left of the midline of the body, then the passer should step toward the receiver with the left foot. A smooth transfer of body weight will enable the passer to execute a more successful pass.

The passer's eyes should move from a position of watching the puck in contact with the stick to a position of focusing on the intended target just prior to the actual execution of the pass. By looking at the target just prior to release of the puck, the passer should increase accuracy. The passer will also be able to determine the appropriate speed to put on the pass by quickly judging the approximate distance to the receiver. After the blade of the stick is directed to the receiver, sending the puck toward the target, the passer should follow through with the stick in a short, low manner toward the target. A properly executed follow-through should also enhance accuracy. The passer should be very careful, of course, not to follow through either high or long or perform any other action with the stick that might cause the stick to strike an opponent.

If the passer initiates a pass while walking or running, all actions are the same except for the synchronization of the actual release of the puck with the shifting of body weight caused by the foot movement of the walk or run. In other words, as the passer, who is walking or running, steps toward the intended receiver to facilitate the transfer of body weight, the release of the puck must occur. This, of course, is more difficult to time exactly if the passer is running quickly down the floor. Players will find that as their skill in passing and stick control increases, the transfer of body weight, especially when executing very short passes, becomes less critical. Experienced players do not need to rely as much on this transfer of body weight for passing accuracy.

Receiving the Pass

In order for a pass to be successfully executed, it must not only be sent toward its intended target but also properly received. Receiving a pass in floor hockey is, in a sense, similar to catching a ball. The player must successfully "catch" the puck with the stick. If this phase of the passing action is performed incorrectly, the puck often bounces off the receiver's stick and into the control of the opponents. Although the ideal position for beginners to be positioned is sideways to the passer, an experienced player can receive the puck from almost any position.

The key factor in successfully receiving a pass is to position the blade of the stick perpendicular to the approaching puck. In this manner, the player is then able to draw the stick back slightly to cushion the puck onto the stick in an attempt to "catch" it. If the receiver's stick is not perpendicular to the approaching puck, then there is a greater tendency for the puck to slide off the blade of the stick. Nevertheless, if the receiver successfully cushions the puck onto the stick, thereby decelerating it, the puck will remain on the stick of the receiver instead of bouncing off.

Practice Drills: Passing

1. Pass the puck against a wall to work on sending the puck in a line perpendicular to the wall. This drill can be modified by increasing the distance between the player and the wall and by varying the speed of the passes.
2. Pass the puck toward a one-foot-wide target on the wall. This drill can be modified by varying the distance between the player and the wall and also by varying the size of the target.
3. Position two players 15 feet apart. The players will pass the puck back and forth. Gradually increase the distance between the players to approximately 30 feet. This drill can be modified by having the receiving player vary the location of his or her stick, which will serve as the target for the pass, and also by varying the speed of the passes.
4. At one end of the gymnasium, form two single file lines of players approximately 15 feet apart and facing toward the opposite end of the gymnasium. Each pair of players will walk the length of the floor, passing the puck back and forth between each other. The second pair of players can begin when the first pair is a safe distance down the floor. As the players come back to the ends of the two lines, they should switch lines so that they can practice passing and receiving the puck with the opposite side of their sticks. This drill can be modified by having the players slowly jog instead of walk.
5. Direct two players to move around the gymnasium floor and pass the puck back and forth between each other. The players can practice moving around all portions of the entire playing area, varying the distance and angles between them.

6. With a goalie standing in front of the goal and one defense person standing near the blue line, two players standing approximately 15 feet apart near their own blue line progress down the floor toward the goalie. The two offensive players pass the puck and attempt to elude the one defense person and execute an open shot on goal.

Shooting

Shooting is the skill used to direct the puck toward the opponents' net in an attempt to score a goal. The three types of shots in floor hockey are (1) the wrist shot, (2) the slap shot, and (3) the backhand shot.

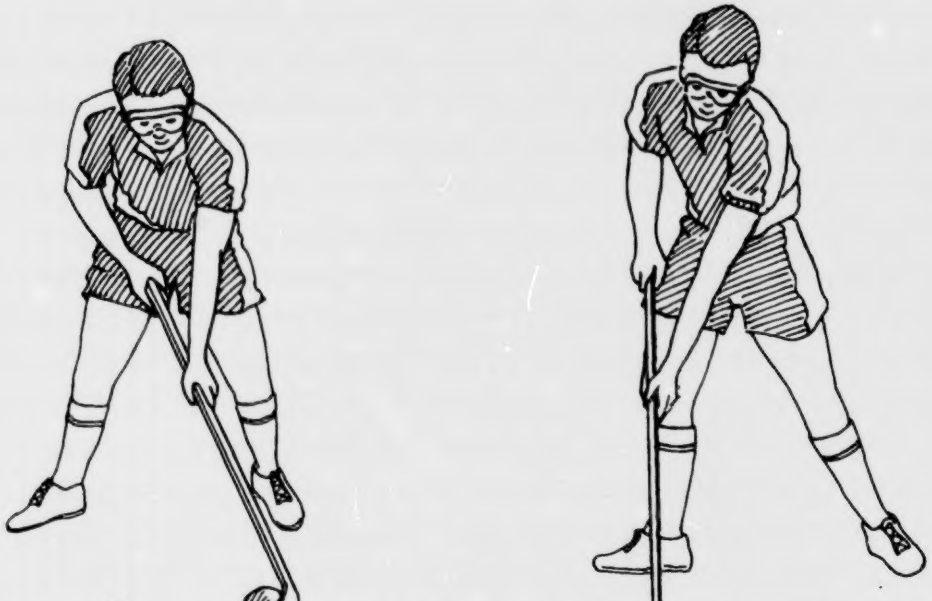
The Wrist Shot

The wrist shot enables the shooter to be very accurate in hitting a specific portion of the opponents' goal. It can also be executed when the shooter is being closely guarded or is otherwise surrounded by several players because the player does not take a windup with the stick. When executed properly, it is a good shot to use in a game (see Figure 2 a and b.)

Preparing to execute a wrist shot is begun by assuming a body position sideways to the goal with the feet slightly wider than shoulder width apart. The left-handed shooter stands with the right side of the body toward the goal. The opposite is true for a right-handed shooter. The wrist shot is initiated by positioning the heel of the stick directly behind and in contact with the puck. The puck is normally directly in front of the rear foot, but it can be as far forward as the midline of the body. The lower hand on the stick is almost straight at the elbow while the top hand is bent at approximately 90 degrees at the elbow. The shooter steps toward the goal with the foot nearer the goal (right foot for a left-handed shooter) at the same time as the stick drags the puck forward and toward the goal. The puck leaves contact with the stick at a position approximately opposite the front foot as the wrists whip forward, imparting considerable velocity to the puck.

The follow-through with the stick is low, short, and toward the target. Players should be reminded to "turn over" the blade of the stick with their wrists after completing the shot so as not to raise the stick up high and possibly hit someone. Players should be cautioned not to intentionally raise the puck to a dangerous level.

Figure 2. Wrist Shot



The puck should be kept either on the floor or low to the floor so as not to strike an opponent or a teammate in the head area. As was described in the passing section, if a wrist shot is initiated from a walk or run, the player must be careful to coordinate the transfer of body weight (i.e., stepping toward the target) with the release of the puck in order to gain maximum velocity.

The Slap Shot

The slap shot enables the shooter to generate more speed on the puck than does the wrist shot, but sometimes this comes at the expense of accuracy. Standing sideways to the target, the shooter assumes a stance with the feet at least shoulder width apart, in such a position that the puck is in line with the front foot. The player draws the stick back in preparation to hit the puck. Although beginning players will need to keep the weight on both feet (see Figure 3, a-c), experienced players will be able to place all of the weight on the front foot as the stick is drawn back into a "wind-up" (see Figure 4). It is very important that the stick stay below the waist so as not to cause a hazard to nearby players. The stick is then brought forward forcefully to contact the puck. Follow-through is forward, short, and low so that surrounding players are not hit with the stick. Players should be taught to turn the blade of the stick over to further protect surrounding players.

It is important for the blade of the stick to make contact with the puck perpendicular to the target. If the stick is even a few degrees off perpendicular, the shot will go wide of the net. It is also important to contact the puck exactly at floor level. If the stick comes forward too low, the stick will hit the floor behind the puck and cause a weak shot. If the stick comes forward too high, the stick will hit the top of the puck and also result in a weak shot. It is even possible to miss the puck entirely if care is not taken with the swing.

The shooter should always keep the head down with the eyes on the puck throughout the entire shot. The slap shot can be taken with very little backswing. Even a short backswing can generate sufficient momentum to the puck to produce a good shot. Great care must be taken to ensure that players do not attempt to generate more force to the puck than they can safely control. A wild, swinging stick can be a serious hazard to both opponents and teammates alike. Players should be reminded that the purpose of the backswing, which absolutely must be low for the sake of safety, is to generate an amount of momentum to the puck equal to the amount of control that is needed on the stick as contact with the puck is made and the follow-through

Figure 3. Slap Shot

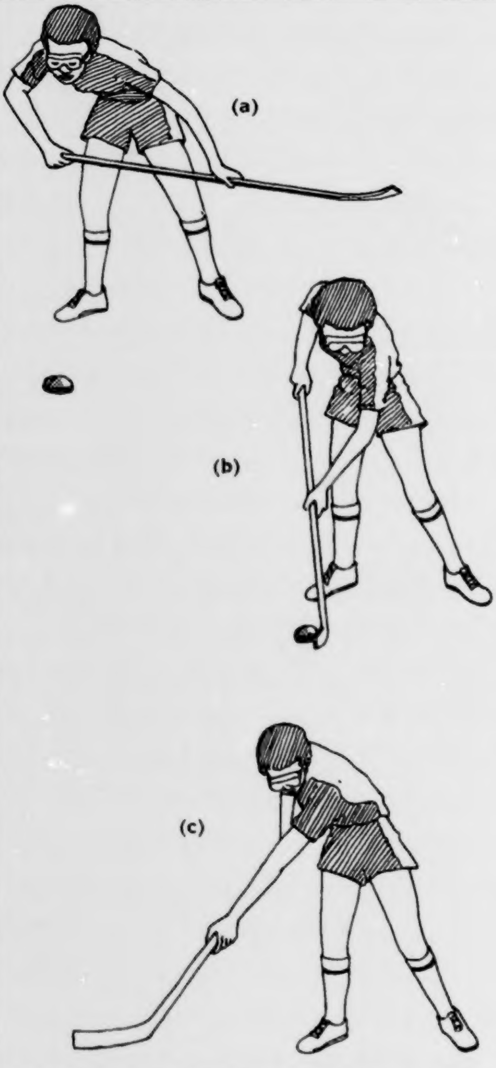


Figure 4. Wind Up for Slap Shot

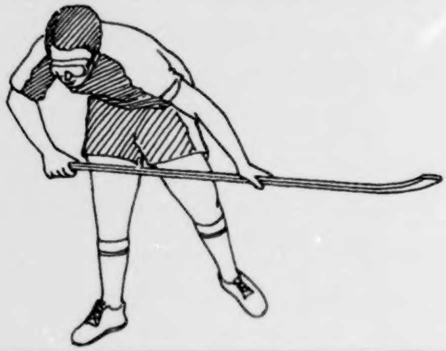
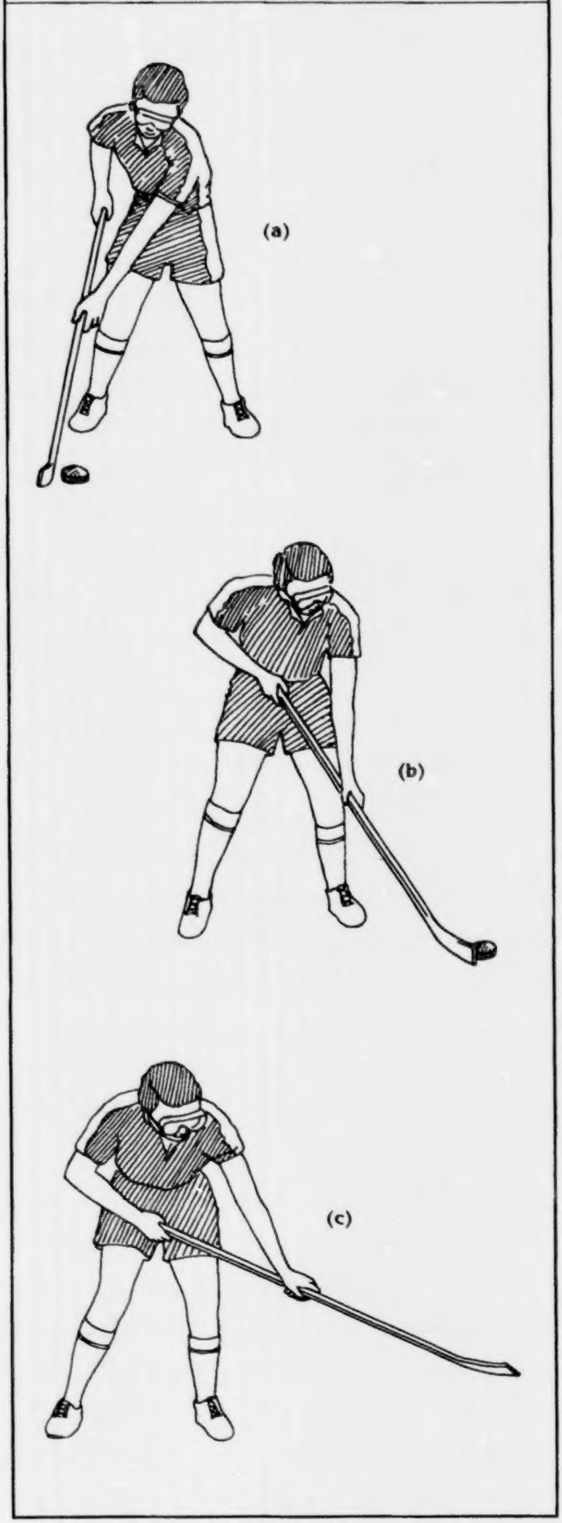


Figure 5. Backhand Shot



is executed. Some players must also be reminded that the slap shot in floor hockey in no way resembles a golf shot.

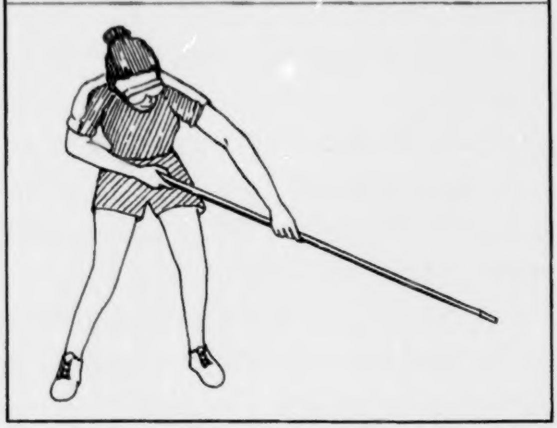
The Backhand Shot
Essentially, the backhand shot is the reverse of the wrist shot. That is, for a left-handed shooter (right hand at top of stick), the puck is shot from the left side of the stick's blade rather than the right side as it is in the wrist shot. Standing sideways to the target with the feet at least shoulder width apart, the player can grasp the stick either with the regular grip (see Figure 5a-c) or adjust the lower hand to where it grasps over the stick (see Figure 6). With the overhand grip, it is possible to generate more power from the shot.

The puck is normally contacted with the blade of the stick directly in front of the rear foot (right foot for a left-handed shooter and left foot for a right-handed shooter), but it can be as far forward as the midline of the body. As in the wrist shot, the puck is dragged with the stick as the stick develops speed. At a point approximately in front of the foot nearer the goal (front foot), the blade of the stick whips the puck forcefully toward the target. At the same time, the weight is transferred from the back foot to the front foot to facilitate balance and to assist in generating speed on the puck. As in all other shots, the follow-through is forward toward the target but also short and low to minimize the risk of hitting a nearby player with the stick.

Practice Drills: Shooting

1. Standing approximately 15 to 20 feet from a wall, practice shooting the puck against the wall to work on sending the puck in a line perpendicular to the wall. This drill can be done with the

Figure 6. Overhand Grip



wrist shot, the slap shot, and the backhand shot. This drill can be modified by varying the distance between the player and the wall and by varying the speed of the shots.

2. Shoot the puck at a one-foot target on the wall using the wrist shot, the slap shot, and the backhand shot. This drill can be modified by varying the distance between the player and the wall and also by varying the size of the target.
3. Standing at various distances from the goal, practice shooting the puck at the goal, using the wrist shot, the slap shot, and the backhand shot. Practice shooting the puck at the corners of the goal. This drill can be modified by placing an obstacle on the floor in front of the goal so that the puck can enter the net only if it is shot into one of the corners.
4. Standing at various distances from the goal, practice shooting the puck at the goal with a goalie standing in front of the goal. This drill can be done using the wrist shot, the slap shot, and the backhand shot.
5. Distribute several pucks one to two feet apart in a line just inside the blue line. Practice shooting the pucks in rapid succession at the goal with a goalie standing in front of the goal. This drill can be modified by distributing the pucks in a line closer to the goal.
6. Standing at various distances from the goal, practice receiving a pass from a teammate and then shooting the puck toward the goal with a goalie standing in front of the goal.

Safety

In teaching floor hockey in elementary, junior high, and high school settings, the possibility of various injuries should be addressed by the teacher. Careful planning is required to minimize the likelihood of injuries. Teachers report that the most common injuries in floor hockey are scrapes, bruises, and/or cuts on the extremities, such as the knees, shins, ankles, feet, hands, wrists, and arms, as the result of being hit by a floor hockey stick. Other injuries identified include those related to being hit by the stick or puck in the head area, including the face, eyes, mouth, and nose. The third category of injuries is related to those caused by collisions between players.

Therefore, the three major safety concerns in the game of floor hockey are related to (1) control of the body, (2) control of the stick, and (3) control of the puck. This section will address each of these concerns.

Control of the Body

Floor hockey is not a body contact sport. Players should learn to avoid collisions. Body checking, a skill that is common in ice hockey, is simply against the rules in floor hockey. Defensive players should learn to "play the puck" when attempting to secure possession of the puck from the offensive player. The offensive player should not be bumped, pushed, or otherwise interfered with in an unsafe manner. When the defensive player attempts to secure the puck from the offensive player's control, there might be some minor, incidental contact simply due to the closeness of the players. However, this type of contact is in no way meant to physically disrupt the opposing player. Aggressive physical contact is punished with a two-minute penalty, during which time the offending player must sit out and the team must play shorthanded. If the shorthanded team is scored against prior to the expiration of the two-minute penalty, the penalized player may return to the game.

Players should also learn to move around the area of play, with and without the puck, by keeping their heads up rather than down. Simply because a player has possession of the puck does not give that player the right to collide with opponents by charging down the floor with the eyes down on the puck. Players must carefully watch where they run. A parallel can be drawn to the game of basketball, where the player with the ball cannot simply collide with a defensive player who might be in his or her pathway. Both players who share the potential to collide must share the responsibility to avoid the collision.

Control of the Stick

Players must learn to control their sticks properly at all times so that improper use of the stick does not cause injuries to other players. The time when use of the stick causes the greatest concern is during shooting. Players must keep their sticks under control during all phases of the shot. This involves taking a short, low backswing, if any, as well as a short, low follow-through after contact with the puck. A long, high follow-through with the stick is a sure way to injure nearby players, both opponents and teammates alike. It is helpful for players to "turn over" the stick blade during follow-through. This prevents the front end of the blade from rising to where it might hit another player.

Under no circumstances should players in floor hockey be allowed to perform "golf shots," where the stick is swung in a very high and dangerous manner. Players who cannot properly execute the shot in floor hockey really should not be playing the game yet. They should devote more time to practice until the shot can be properly executed.

Control of the Puck

Regardless of the exact type of puck used in the game of floor hockey, it is inevitable that it will occasionally rise off the floor, even to a height that could strike a player in the head or upper body. This might occur as the result of a deflection off a stick that is held out to block a shot, where the blade of the stick is tilted back in such a position as to cause the puck to rise. Some of these situations are perhaps unavoidable. However, players should learn not to raise the puck purposely to levels that present a potential danger to other players. This can be done by teaching players to perform shots that keep the puck either on the floor or very close to the floor.

More specifically, players should be taught not to tilt the stick blade backward when performing a slap shot, not to use excessive wrist action during the wrist shot, not to "scoop" the puck during the wrist shot and backhand shot, and not to bend the blades of the floor hockey sticks. Each of these actions, if performed, might cause the puck to rise unnecessarily high.

In addition, use of protective eye goggles and protective mouthguards will help in preventing many injuries caused by inadvertent high pucks as well as high sticks. For these same reasons, goalies should wear protective face masks.

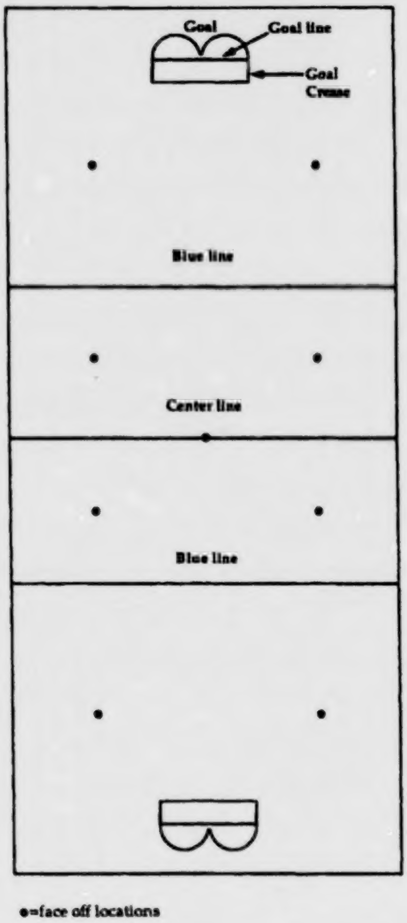
The Playing Area

The playing area is divided into four sections (see Diagram 3). The centerline divides the floor into halves. Within each half, there is a blue line (or any other color of tape that one wishes to use) to identify each team's attacking zone. The distance between each team's blue line and the end of the playing area is approximately one-third of the playing area. Therefore, the distance between the two blue lines is approximately one-third of the playing area. This floor space between the two blue lines, divided evenly by the centerline, is known as the neutral zone. These zones are important in determining offside passes.

If there are no floor or wall obstructions, the entire floor space is used as the playing area. This allows the players to execute passes by deflecting the puck off the gymnasium walls to elude opponents. This also maintains an almost continuously moving game by not having play stop when the puck crosses an out-of-bounds line as in basketball. However, if there are floor or wall obstacles that pose a risk of injury to players, the area near the hazard(s) could be deemed out of bounds, in which case play would stop if players approach the obstacles.

Another strategy would be to place padding around the obstacles to allow play to continue. Still another modification would be to play the game within the basketball lines or other lines already painted on the floor. This would assist in keeping players away from the walls if, perhaps, several obstacles are present. When the puck leaves the playable area by crossing the out-of-bounds line, play could be restarted by either having a face-off or even more quickly by allowing the non-

Diagram 3. The Playing Area



offending team to either pass the puck back into the playable area or bring the puck back in by means of stick handling.

The goals are placed near each end of the playing area, approximately 10 feet out from each end wall. This allows play to occur behind each goal. In small playing areas, it might not be feasible to position the goals away from the end walls. It is often helpful to secure the goals to the floor with tape so that they will be more stable if they are bumped during play.

The goal area is bounded by a goal crease, a taped area on the floor that indicates the floor space into which opponents must not enter. The purpose of the goal crease is to allow the goalie adequate freedom of movement near the goal so that he or she will be able to block shots without interference from opponents. The goal crease, although normally a rectangle, can also be arc-shaped. The rectangular goal crease begins one foot to the side of each goalpost and runs four feet out from the goal. Of course, the size of the goal crease can be modified by making it larger if more protected space is desired for the goalie.

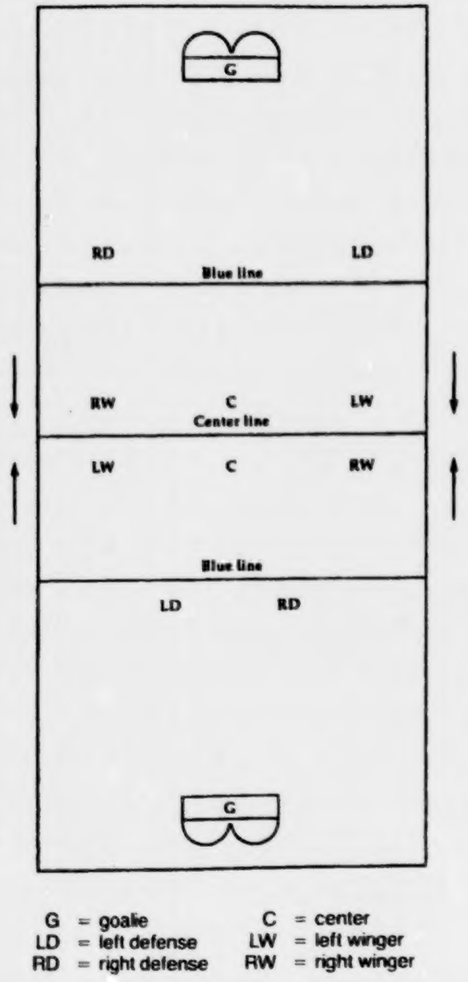
If the game of floor hockey is played in a very small gymnasium, or if two games are being played simultaneously across the width of a gymnasium, the teacher might choose not to use the rule preventing offside and two line passes because the area of play is rather restricted due to the limited playing area. If the area of play is very limited, care should be taken to determine that the regulation number of six players on the floor per team does not cause an overly crowded situation, in which case teams might play with four or five players rather than six. If two games are being played simultaneously on adjoining playing areas, an appropriate buffer zone of several feet in width should be identified and clearly marked on the floor to prevent collisions between players from the adjoining playing areas.

The Players

Floor hockey is played between two teams of six players each (see Diagram 4). Each team consists of three forwards, two defense persons, and a goalie. The three forward positions consist of the center and a right and left winger. The defense persons are referred to as right and left defense. Each player has both offensive and defensive responsibilities. Although the three forwards score the majority of a team's goals, they also must play sound defense. When the opponents gain possession of the puck and begin to advance toward the goal, the forwards must quickly run back to assume defensive responsibilities. Hardworking forwards can often break up the opponents' developing plays before they can advance completely into scoring range. Forwards who are slow to move back toward their goal to play defense often find that a shot on goal occurs before they are able to fully participate in the action again. Of course, this will result in many goals because the opposing three forwards will often be challenging only the two defense persons and the goalie.

Similarly, even though the defense persons are known for their defensive responsibilities, they are instrumental in developing and maintaining offensive pressure on the opponents. As the defense persons gain possession of the puck, it is they who begin the next offensive play for their team by passing the puck ahead to their forwards. The goalie is the player who

Diagram 4. The Players at the Beginning Face-off



usually has the last chance to prevent the opponents from scoring. Although not all players will develop an interest in goal tending, some will inevitably be drawn to the position. Some players absolutely crave the challenge of successfully stopping the opponents' shots on goal. The successful goalie is one who has quick reflexes, can concentrate on the fast-moving action, and has good vision to track a variety of shots. Goal tending will be discussed in more detail in the next section.

Goal Tending

The goalie plays a very important role in the success of a team in floor hockey. The goalie must learn how to effectively use and stop shots with the stick, with the catching glove, and with the body as well as being laterally mobile across the width of the goal. The goalie assumes a stance with the feet at least shoulder width apart and the knees comfortably flexed. The body is bent slightly forward at the waist, the back is relatively straight and upright, and the head is held up. The dominant hand grasps the stick approximately halfway down the handle, just above the widened portion of the handle. The other hand holds a catching glove, commonly a baseball or softball glove. The stick is held in front of the body with the blade directly in front of the feet. The catching glove is held up slightly to the side of the body in preparation to catch any high shots.

The goalie should be taught to remain on his or her feet as much as possible in order to maintain maximum mobility near the goal. There may be times when the goalie goes down onto one knee in an attempt to secure a loose puck or a rebound. In any case, goalies should be taught not to sprawl onto the floor or commonly go down to the floor, particularly when the action is very close to the goal crease. A goalie is less mobile and therefore less effective whenever not on the feet. Also, by remaining on one's feet, there is a decreased likelihood that the goalie will be hit in the head area with a stick or puck.

The goalie may hold onto any shot that is stopped, thereby requiring a face-off to restart play. This is commonly done when there are several opponents in close proximity to the goal and when releasing the puck might result in a sudden shot by an opponent. The face-off would be taken in the face-off area corresponding to the direction from which the shot originated, either to the right or left of the goal. When there are no opponents in close proximity to the goal, the goalie usually does not hold onto the puck when a shot is blocked. Instead, the goalie will use the stick to direct the puck to the nearest teammate.

The Game

The game of floor hockey begins with all players on their own side of the centerline. The referee drops the puck between the sticks of the two centers, who are facing each other with their sticks on the floor. This is known as a face-off. The tips of the blades of the two centers' sticks are approximately 6 to 10 inches apart. As the referee drops the puck, both centers attempt to gain possession of the puck by pulling or hitting the puck either back to a winger or to a defense person. An alternate strategy is to hit the puck forward into the opponents' zone and proceed after the puck.

A goal is scored when the puck completely crosses the goal line in the opponents' goal. A puck must be shot into the goal, rather than kicked or hit with the hand or another body part, in order to be considered a legal goal. After the shot, however, the puck may deflect off either an offensive or defensive player or both prior to entering the net. It may not, however, be intentionally directed into the net with the body. Following each goal, play is begun by conducting a face-off at the center of the playing area in the same manner as at the beginning of the game.

When players are moving around the playing area in an attempt to elude opponents and get open to receive a pass, they must be careful not to commit an offside pass violation. An offside pass can occur in two ways. First, it is a violation if a player passes the puck from behind his or her own blue line and it crosses both the blue line and the centerline before it is received by the passer's teammate. This is commonly referred to as a "two line pass." Another example of a two line pass that is also illegal is a pass sent from between one's own blue line and the centerline across the centerline and across the opponent's blue line. The second type of offside pass is one that is initiated from the area between the centerline and the opponents' blue line when the pass receiver has both feet across the blue line before the puck crosses the blue line. It is legal, however, for the pass receiver to have one foot across the blue line as the puck passes the opponents' blue line.

The purpose of ruling these offside passes illegal is to allow the defense persons the opportunity to come up to the opponents' blue line in an attempt to keep the puck in the attacking zone without having to be constantly caught with opponents behind them ready to receive a long, two line pass that could easily result in a breakaway. After a whistle is blown to stop play following an offside pass, a face-off is done from the zone in which the offside pass originated. Of course, instructors could modify the game to allow either or both of the offside pass situations previously described.

Tactics and Strategies

Although all of the players (particularly beginners) might be tempted to follow the puck around the entire playing area, it is important for each player to play his or her assigned position so that when the puck does enter the player's zone of responsibility, he/she will be there. It takes considerable self-discipline to stay in one's general area of responsibility, particularly when one is new to the game. With experience, however, players learn not only to play their assigned positions but also when to leave their assigned positions to chase a loose puck, when to cover for another player who has left his or her position to secure a loose puck, and when to leave one's position to double-team an opponent. Players must know that their teammates will be in their assigned positions so that consistent passing can occur. This section will discuss various tactics and strategies related to playing effective offense and defense.

Offense

When a player secures control of the puck inside his or her own blue line, it is generally advisable to advance the puck either by stick handling or passing the puck out to either side of the playing area. This is particularly important when the player is very close to his or her own goal. It is often more difficult to advance the puck out of one's own end by going up the middle of the floor. Normally, the player will encounter more opponents if this is attempted. As the player with the puck approaches the centerline, it is then advisable to stick handle or pass the puck back in toward the middle of the floor. In this manner, the team on offense can attempt a balanced attack as they approach the opponents' blue line. This would involve the three forwards spread evenly across the floor in their assigned positions. If the center happens to move either right or left with the puck, the corresponding winger can switch with the center to maintain a balanced attack.

As the offensive team penetrates the opponents' blue line with the puck, the defense persons on the offensive team should follow the three forwards up the floor. The two defense persons will, if possible, advance up to the opponents' blue line. From this floor position, either defense person will have an opportunity to keep the puck inside the opponents' zone if it appears that the puck might be hit across the blue line by the defensive team. If the defensive team succeeds in hitting or stick handling the puck out of their zone (i.e., across the blue line), the defense person on offense who intercepts control of the puck must wait for all of his or her teammates to vacate the opponents' zone before sending the puck back across the blue line. If all teammates do not cross the blue line with at least one foot before the puck is sent back in, the referee will rule an offside pass and have a face-off outside the blue line.

When the puck goes into either corner of the offensive zone, the corresponding winger should go after the puck. If the winger is successful in gaining control of the puck in the corner, the winger should attempt to pass the puck to in front of the opponents' goal. At this time, the center should be positioned directly in front of the goalpost nearer the same corner as the puck. The opposite winger should be positioned directly in front of the opposite goalpost. Of course, players can move from these specific positions when it is advantageous to do so to secure a loose puck or to elude the opponents; however being in these general locations will increase the likelihood that the winger with the puck in the corner will be able to execute an effective pass to an open teammate.

Defense

When the offensive team loses control of the puck in the opponents' zone, all of the players must quickly change from an offensive mode to a defensive mode. This includes the three forwards as well as the two defense persons and the goalie. Good defense begins as soon as the attacking team loses control of the puck. It is possible that the team who has just lost control of the puck can regain control of the puck again even before the offensive team can cross their own blue line with the puck. This can be done by cutting off the main routes out of their own zone—up the right side, up the left side, and up the middle. If these passing lanes are filled by alert defensive players, the defensive team might soon find themselves back on offense again.

Forwards on the defensive team should continue to put pressure on the offensive team as the puck crosses the offensive team's blue line and progresses up across the centerline. Defensive pressure should be closely applied as the offensive team approaches the defensive team's blue line because the offensive team is within

shooting range. This close pressure is crucial in preventing the offensive team from executing clean, unhindered shots on goal.

When the puck goes into either corner of the defensive zone, the corresponding defense person should quickly follow after the puck in an attempt to beat the offensive winger into the corner. The other defense person guards the other winger in front of the net, while the defensive center guards the offensive center in front of the net. If the defense person is successful in gaining control of the puck in the corner, the defender should attempt to stick handle or pass the puck out of the defensive zone by selecting a route up along the side of the playing area. Care must be taken not to allow the puck to be passed out of the corner to any location near the goal. Often the defender will execute a pass off the wall up to one of the defensive team's forwards, who should be inside his or her own blue line.

When the puck goes out to the attacking team's defense persons inside the defensive team's blue line, the defensive team's forwards must apply enough pressure to prevent an unhindered shot from being taken. In this case, the defensive left winger will apply pressure to the offensive right defense person, while the defensive right winger will apply pressure to the offensive left defense person.

Rules

1. Teams consist of six players, including the goalie, on the floor at one time. Substitutes may enter the game during any stoppage in play or by "changing on the fly" directly in front of the team's bench area while the puck is in play.
2. A goal is scored when the puck completely crosses the goal line.
3. A player may not enter the opponents' goal crease. If a goal is scored while an opponent is in the goal crease, the goal is not allowed.
4. Body checking, pushing, or other rough play is not allowed. Floor hockey is not a body contact sport. Incidental contact might occur as two opponents attempt to play the puck, but this contact is penalized if it is done in an intentional, aggressive, or dangerous manner. (Penalty: two minutes.)
5. A player may not trip an opponent using the stick, feet, legs, or other body parts. (Penalty: two minutes.)
6. A player may not use the stick to slash at an opponent or the opponent's stick in any action where the player is obviously not playing the puck. (Penalty: two minutes.)
7. A player may not raise the stick above the height of the waist. (Penalty: two minutes.)
8. A player may not hook an opponent with the stick in an attempt to impede the progress of the opponent. (Penalty: two minutes.)
9. A player may not hold an opponent in an attempt to impede the progress of the opponent. (Penalty: two minutes.)
10. A player may be penalized for any action deemed by the referee to be unsportsmanlike or dangerous. (Penalty: two minutes.)
11. A player may not deliberately direct the puck into the goal using the hands, feet, or any other body part. In order to be counted as a legal goal, the puck must be shot with the stick; however, after the shot, the puck may legally deflect off a player, either a teammate or an opponent or both, and go into the goal.
12. When a player is charged with committing a penalty, the player must serve a two-minute penalty by leaving the floor for two minutes of actual playing time. During this time, the player's team must play with one player fewer than the opponents. If during this two-minute time period, the same team commits another penalty, the offending player must leave the floor for two minutes of actual playing time, and the offending team must play now with two players fewer than the opponents. At no time will one team play with more than two players fewer than the opponents. Therefore, if the same team commits another penalty during the time when they already have two players serving penalties, this third penalty is delayed until the first player's penalty is served.
13. Players may not complete an offside pass. Following an offside pass, play is restarted with a face-off in the zone from which the offside pass originated.
14. Players may use the hands to knock a high-flying puck straight down to the floor. They may not attempt to advance the puck with the hands. If this is done, a face-off will result. Only the goalie may grasp the puck with the hands to stop play.

Equipment

Basic equipment items for the game of floor hockey include the stick and puck. Sticks come in various styles, materials, and lengths. Typical floor hockey sticks range from the short, plastic blade sticks with hollow, plastic handles to the longer, wooden-handled sticks with plastic blades with various versions in between. It is not recommended to play floor hockey with wooden-blade ice hockey sticks. (Also, it is not recommended to use the type of wooden-handled stick that has no blade, with which players propel a "doughnut" type of puck by placing the tip of the stick handle inside the "doughnut.") Each major physical education and sport equipment supplier has at least one type of floor hockey stick and sometimes more from which to choose.

Pucks also come in various types. These range from the plastic, hollow variety to the plastic weighted pucks, with various alternatives in between. Although the weighted pucks tend to stay on the floor better than do some of the hollow pucks, one must consider the potential that these pucks have to cause greater injury to a player when one is hit by the puck. They are, therefore, not recommended.

Some manufacturers produce a special low bounce or "no bounce" type of ball to be used in the game of floor hockey. One consideration in using this device is the fact that it tends to have a true roll, whereas some pucks do not when they roll on edge rather than slide. Additionally, these balls do tend to stay low when they bounce. Another available option is a small, soft, foam ball.

Other equipment includes protective eye guards or goggles to prevent eye injuries caused by the puck or ball and sticks. Protective mouthguards serve to protect the teeth against damage. Players' hands can be protected by wearing leather work-type gloves.

Protective equipment for the goalie includes a face mask to guard against injuries caused by being hit in the face by a puck or ball while trying to stop shots on goal or being hit in the face by a stick in action close to the goal. Other goalie equipment includes a chest protector, a baseball-style catching glove, and a protective cup, all used to protect the goalie from shots on goal. The goalie's stick hand can also be protected by wearing a leather work-type glove.

Portable, metal goals can be purchased from various suppliers, or tape can be put on the two end walls in a rectangular fashion to serve as goals. It is often difficult to determine whether a shot actually scored, however, with the goals made of tape on the end walls because some shots will hit the wall very close to the tape and rebound quickly. Portable, metal goals with a cord mesh are preferable.

References

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CHAPTER 12

Golf

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Introduction

Golf is a game for a lifetime and, being a game, is meant to be enjoyed. Participation in golf activities can begin as early as pre-school age and last through one's senior years. Golf is a game that all individuals can play regardless of size, strength, age, or sex. As with most sports, performing golf skills with a lack of consistency can challenge the golfer's emotions. However, with appropriate instruction and a commitment to learning through study and practice, a greater degree of consistency in performance can be achieved. To the casual observer, it does not appear that putting, chipping, and swinging a golf club are difficult skills to perform; however, it is important that the student, as well as the teacher, understand that it takes considerable time to learn a psychomotor skill with a relatively high degree of proficiency. The findings of some research indicate that it takes numerous attempts at a skill before it is learned (average = 20 practice sessions, 60 attempts). This information is presented not to discourage one from learning golf or other sport skills but to encourage patience as learning is taking place. Learning golf is not a destination but a lifelong journey, and students of the game of golf should enjoy the trip.

Golf is a target game. As with an archer attempting to hit the bull's-eye of the target or the player shooting a basketball at a goal, golfers should always direct their efforts in performing golf skills that would allow the golf ball to travel to a desired target. Examples of targets in golf may include landing the tee shot on a specific area of the fairway, hitting an approach shot to a spot on the green, or starting a putt rolling toward a specific target that will allow the ball to roll into the hole. A common mistake made by golfers is defining their target in gen-eral terms. As the archer is not simply trying to shoot an arrow that will hit the target but to hit the bull's-eye, the golfer should not be hitting the ball to a general area on the golf course but to a specifically defined target. Focusing to hit a golf shot that would allow the ball to stop on the left side of the fairway is a general target. which is any area that is left of center of the fairway. Choosing a small patch of discolored grass or other distinguishing marks on the fairway to hit your golf shot to is an example of narrowing the focus to a specific target. As the individual learns to perform golf skills with a reasonable degree of consistency, the individual is better able to hit specific targets on the golf course. The practice of selecting specific targets on the golf course should start as one begins to learn to play golf.

Information included in this chapter relates directly to the learning objectives listed below:

- Understand the challenge of learning golf skills
- Understand common terminology used in golf
- Understand basic physical fitness requirements to enhance a golfer's performance
- Understand cause and effect factors that influence ball flight
- Understand and be able to demonstrate pre- and in-swing fundamentals of the short and long game
- Understand the etiquette of golf
- Have a general understanding of the game of golf
- Understand some of the more commonly used rules that govern participation in golf
- Understand the basic types of equipment that is used to play golf

Terminology

Address (setup). Preparation to swing the club by taking a stance and placing the club on the ground behind the ball.

Apron. Short grass surrounding the green.

Birdie. One stroke less than par.

Bogey. One stroke more than par.

Casual Water. Water on the course not intended to be a hazard.

Divot. Turf removed from the ground while hitting the ball

Dogleg. Sharp bend or curve in the fairway.

Double Bogey. Two strokes more than par.

Eagle. Two strokes less than par.

Fairway. The grass between the tee area and green that is kept closely mowed.

Fore. A warning cry to individuals who may be hit by a ball.

Green (putting surface). The very closely mowed area on each hole where the cup is located.

Handicap. A rating of a player's ability to shoot par. Handicaps may be used to equalize competition between individuals with different abilities. Also, a numerical rating of the respective golf holes on a golf course from the most difficult to the easiest.

Hazard. Encompasses several specific obstructions designed as challenges to the golfers. These include natural features such as sand and grass bunkers and permanent water (lakes, streams, ponds).

Honor. Order of teeing off (lowest score on preceding hole).

Match Play. Golf competition in which each hole is a separate contest. The winner of the match is the player who has won the most holes in the competition.

Out-of-Bounds. Area that is not part of the golf course.

Par. Standard score set for a hole.

Provisional Ball. A second ball hit when the first ball is thought to be lost or out-of-bounds.

Release. When the toe of the club passes the heel during the golf swing

Rough. The long grass parallel to the fairway.

Stroke Play. Golf competition in which the winner is determined by the total number of strokes for the round or rounds played.

Sweet Spot. The point of the club face, that, when struck, does not cause the club head to torque.

Target Foot. When addressing the ball, the target foot is the one closest to the target.

Tee. A peg (usually wooden) on which the ball may be placed on the teeing area.

Teeing Area. Area from which you begin each hole, usually a level surface with the grass mowed short.

Unplayable Lie. A position of the ball from which it may be difficult to hit.

Fitness Requirements

All things being equal, the higher the golfer's level of physical fitness related specifically to golf, the higher the quality of the golfer's performance. Individuals can use appropriate weight training to increase strength, flexibility, and muscular endurance, which will enhance their ability to perform golf skills. Another component that should be included in a total fitness program for golfers is cardiovascular endurance.

Lifting weights that will allow an individual to comfortably complete three sets of 10 repetitions, going through a full range of motion and working the major muscle groups, will increase strength, flexibility, and muscular endurance. Cardiovascular fitness can be developed by participating in three aerobic workouts each week that keep you breathing hard for 20 minutes. Activities such as race walking, jogging, swimming, and cycling are examples of appropriate activities for developing cardiovascular fitness.

Prior to starting a physical fitness program, individuals should have a physical examination from a doctor. Also, prior to lifting weights and participating in an aerobic workout, individuals should warm up properly.

Cause and Effect

The factors the golfer must address while playing golf are distance and direction. Dr. Gary Wiren, author of the *PGA Teaching Manual*, refers to the factors that relate to distance and direction as ball flight laws. The golfer should have an understanding of these laws because they are directly related to the task of dealing with the distance and direction a ball will travel. These laws apply *only* to the club at the moment it impacts the ball.

Ball Flight Laws Affecting Distance

- Club head speed
- Contacting the golf ball on the "sweet spot" of the club face
- The angle (steepness) at which the golf club approaches the ball

Ball Flight Laws Affecting Direction

- The swing path of the golf club (direction the club is traveling)
- The angle of the club face relative to the swing path

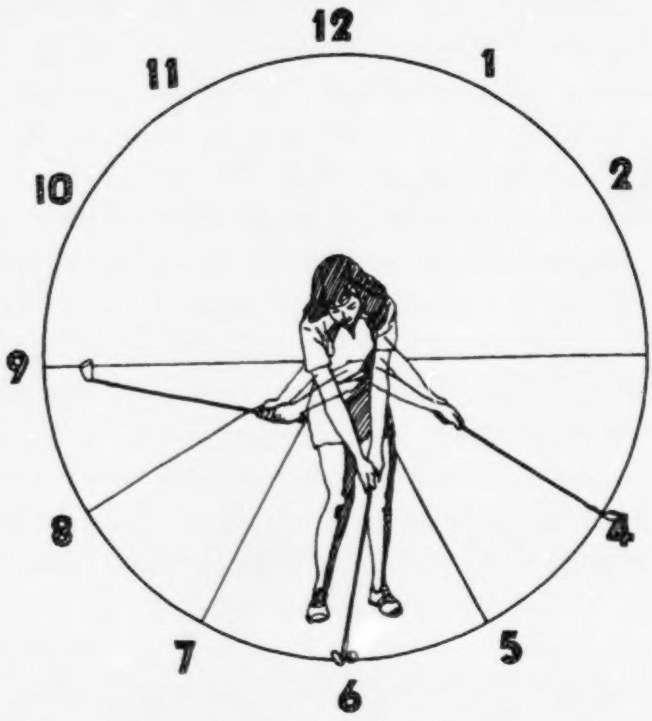
The Skills of the Game

Golf is considered to have two games within itself, each requiring specific skills. The short game, considered by some instructors to be the most important part of golf, requires the golfer to perform selected skills (putting, chipping, and pitching) inside the distance of 100 yards from the hole. The long game consists of shots (full swings) performed outside the distance of 100 yards from the hole. In both the short and long games, there are pre-swing and in-swing fundamentals that need to be learned and performed. Pre-swing fundamentals include posture, grip, and alignment (PGA), and in-swing fundamentals include the mechanical aspects of sequential body movements made in order to direct the ball in a given direction and specific distance. The information that is presented in this chapter will be described for the right-handed golfer. Individuals who are left-handed should reverse the information presented in this chapter. The "clock" method will be used for the purpose of describing club head positions (see Figure 1).

The Short Game

The short game, consisting of shots the golfer makes inside the distance of 100 yards from the hole, is also referred to as the "scoring game." Approximately 65% of shots during a round of golf by all golfers are made within this distance. What does this imply for the golfer's practice regimen? When practicing to improve performance, 60%-65% of the individual's practice time should be made on shots within this distance, allowing the remainder of time to practice for shots outside the distance of 100 yards from the hole. If the short game is considered the "scoring game," then practicing the skills within this aspect of the game is the most expedient way to lower one's golf score.

Figure 1. The "Clock" Method



Putting

Pre-Swing Fundamentals

Putting is the easiest skill to perform in golf. However, putting requires very precise accuracy. It is important that sound fundamentals be established that will enhance the opportunity for a successful putting stroke to be made. The degree of slope on the green (uphill, downhill, side-hill) will have a significant bearing on the effect gravity has on the distance and direction the ball will travel. Also, grass will grow in a given direction (grain) on the green, and when the ball rolls in the direction the grass is growing, it will roll faster. If it is rolling in the opposite direction the grass is growing, it will roll slower. The skill that allows the golfer to evaluate this information is called "reading the green." There are few guidelines that can be suggested for the golfer to develop "green reading" skills other than to practice putting and learn how the golf ball reacts to these factors.

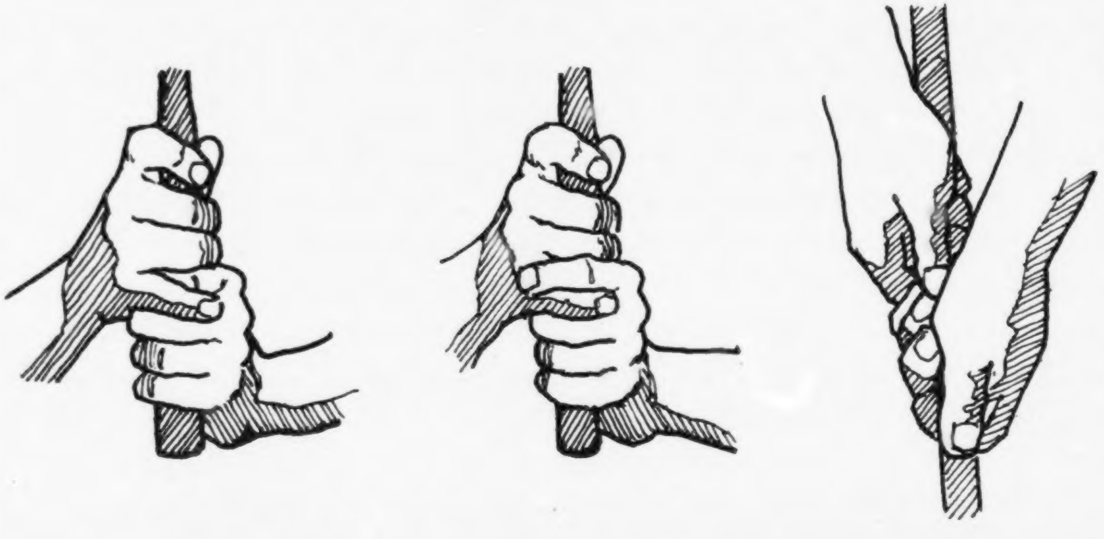
Grip

There are a number of ways to grip a putter, such as the overlap, reverse overlap, left hand low, and others (see Figure 2a-c). There is less emphasis placed on the putting grip than when gripping the club for other golf shots due to the slow speed the putter is traveling when it strikes the ball. However, there are criteria that should be considered when gripping the putter. First, when the grip is taken, the palms of the hands should be facing each other and the thumbs should be on top of the shaft and pointing straight down the shaft (see Figure 3). Second, the grip pressure can be light or firm but never tight, and this pressure should remain constant throughout the putting stroke.

Aim

Aim is vital to insuring that the ball has the best chance of getting to the intended target. First, the face of the putter should be aimed at the target. If there is no slope on the green, the target will be the hole. However, there is normally some slope on the green; therefore, the target will seldom be the hole. In most cases, the target will be a spot on the green that, when the ball crosses it, the ball will have the direction and speed to roll into the hole. Once the club face is aimed at the target, the golfer takes a stance in which both feet are perpendicular to the target line and the hips and shoulders are parallel to the target line. Other than the appropriate alignment of the putter face to the target, the next most important factor in the setup is aligning the shoulders parallel to the target line, because the putter is swung on the same alignment as the shoulders.

Figure 2. Grips

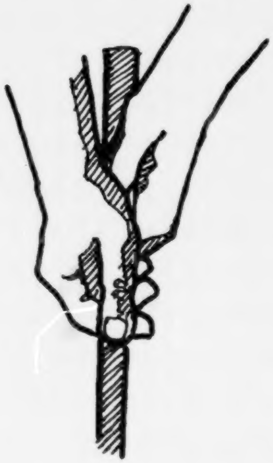


a. Overlap Grip

b. Reverse Overlap Grip

c. Left Hand Low Grip

Figure 3. Putting Grip



Posture/Ball Placement
Posture can be somewhat flexible when making the putting stroke; however, several factors should be considered. The ball should be placed to the left of the centerline of the body. Posture for putting should allow the golfer's arms to hang down comfortably from the shoulders, with a slight tilt of the spine and flex in the knees. A posture should be taken that will allow the eyes to be directly over the ball or slightly inside (see Figure 4). This allows the golfer the best opportunity to see the line on which the ball is to start rolling. The width of the stance should allow the heels of the feet to be inside the width of the shoulders. About 60%-70% of the body's weight should be distributed on the target foot.

In-Swing Fundamentals
The putting stroke itself is controlled by large muscles. The arms, hands, and putter move because the shoulders rock up and down. In performing the skill in this manner, the putter will go straight back and straight through on the target line. The exception to this is when the ball has to travel a long distance and a longer stroke is needed. When this occurs, the putter will come slightly inside the target line on the backswing, but will do so naturally, because the arms are rotating around an axis (the body). During the putting stroke, the individual's lower body and head should remain PERFECTLY STILL and the wrists should remain firm (not hinging). This will enhance the ball being struck on the "sweet spot" of the club face. It is imperative that the putter be accelerating as it makes contact with the ball.

Common Errors and Corrections for Improvement

Error: Eye line not directly over the ball

Correction: Once the posture is taken for making a putting stroke, hold a ball on the bridge of the nose and drop the ball. If the eyes are directly over the ball, the ball dropped should strike the ball on the ground

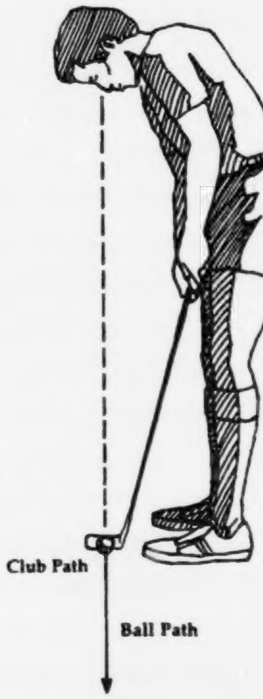
Error: Club face not square to the target

Correction: Practice by placing a board (2x4, square on the end) parallel to and inside the target line, with the end of the board near the ball. Place the face of the putter on the end of the 2x4; then, without changing the face alignment, slide the putter out behind the ball. This form of practice will provide the golfer a picture of a club face square to the target line.

Error: Head moving and too much body motion

Correction: To correct head movement, have a friend place a coin on the ground with the ball on top of it. Putt the ball and identify whether the coin is

Figure 4. Eye Position for Putting



"heads or tails" before looking up. If the lower body is moving, take your putting posture next to an immoveable object (fence post, wall) and, with your left hip touching the object, make a putting stroke. If your lower body moves, you will feel resistance against the object.

Error: Failure to accelerate through impact
Correction: Practice having the putter travel twice as far toward the target as it traveled in the backswing. Using a piece of chalk, make a mark 6" behind the ball and a mark on the grass 12" in front of the ball. Practice taking the putter back to the 6" mark and following through to the 12" mark.

Error: Not striking the ball on the sweet spot on the club face
Correction: Hold the putter with the thumb and index finger on the end of the grip. Holding a coin in the other hand, strike the face of the putter with the coin at different places until a point is struck that causes the putter to move back without torquing. This is the sweet spot of the club face. Wrap two rubber bands around the putter face about .25" on each side of the sweet spot. Putt the ball without striking the rubber bands. As you practice, continue to narrow the gap between the rubber bands.

Chipping

Pre-Swing Fundamentals

The chipping stroke is the second easiest skill to perform in golf; however, the accuracy needed in performing this skill is crucial. The chip shot is used when the ball is near the green and the surface between the ball and the green is such that, if putted, the ball will not roll smoothly toward the target. If the surface between the ball and the green will allow the ball to roll smoothly on the intended target line, the ball should be putted. The chip shot is performed with a low-lofted club so that, when the ball is struck, it will become airborne enough to clear the uneven surface between the ball and the green, land on the green, and begin rolling towards the target.

Grip

The grip that is used should allow the club face to stay perpendicular to the target line through impact. In most cases, the grip should rest more in the palm of the left hand, with the grip of the club running along the lifeline of the palm and cradled in the fingers of the right hand (see Figure 5). Gripping the club in this manner minimizes releasing the club, decreasing the amount of side spin on the ball and resulting in a straighter roll once it hits the green. The grip pressure can be light or firm, but never tight, and should remain constant throughout the swing.

Aim

The bottom edge of the club face should be perpendicular to the target line. The golfer's feet should be pointed perpendicular to the target line, although some golfers prefer to turn the target foot out slightly (open stance), which will result in the hips turning in the same direction. In choosing this stance, the golfer must be careful not to allow the shoulders to turn with the hips. The shoulders must remain parallel to the target line because the club will swing on the line of the shoulders. The golfer's eyes should also be parallel to the target line so that the target line will not be distorted.

Posture/Ball Placement

In establishing a posture for the chipping stroke, the golfer should employ a slight tilt of the spine and flex in the knees and a stance that places the heels inside the width of the shoulders. The arms should hang down comfortably from the shoulders. Ball placement should be slightly to the right of the centerline of the body, with the hands at the body's centerline for standard chips (ball sitting on top of the grass) (see Figure 6). If the ball is nestled down in the grass, the ball should be farther back in the stance. This ball position will allow the club to approach the ball at a steeper angle, maximizing contact with the ball and minimizing contact with the grass. Approximately 70% of the

Figure 5. The Chipping Grip

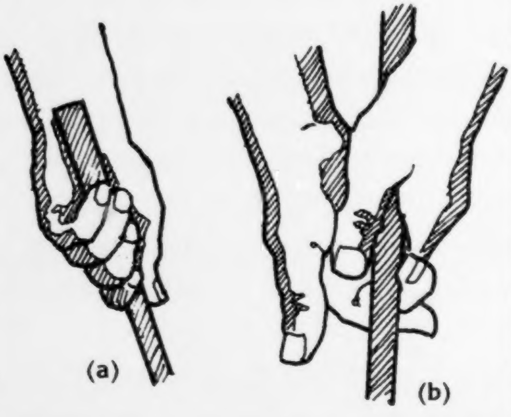
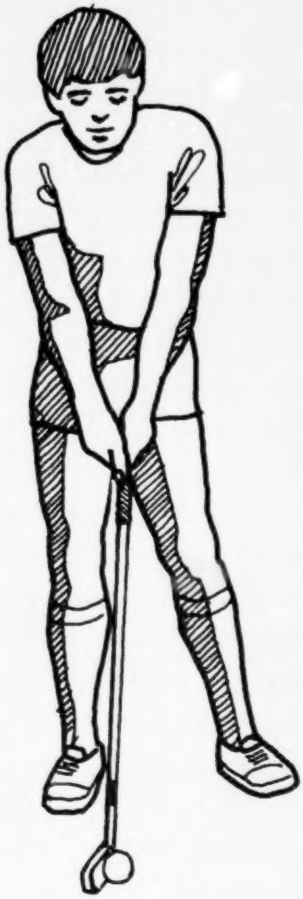


Figure 6. The Chip Shot Set-Up Position



body's weight should be on the target foot. This posture and ball placement allows the golfer to more easily strike the ball with a descending angle of approach.

In-Swing Fundamentals

The chipping stroke is very similar to that of the putting stroke. The shoulders basically rock, utilizing the large muscles to swing the arms, hands, and club. It is *imperative* that the relationship of the hands to the club head that was established at the outset of the swing be maintained throughout the swing. In doing so, the wrists will remain firm (not hinging), allowing the hands to stay in front of the club head until after impact. The club must be accelerating through impact and be descending as it strikes the ball. It is important that the body be relaxed, which will allow it to move a little during the chipping stroke. The head remains still.

Common Errors and Corrections for Improvement:

Error: Hinging the wrists

Correction: Cut off the end of the grip of a practice club and insert a 2' long dowel rod in the end of the shaft. Take your setup, holding the practice club by its grip with the dowel rod extending under the left arm. Swing the club only with the shoulders while maintaining firm wrists. If the wrists remain firm, the dowel rod will not touch your left side during the stroke. If the wrists hinge, the dowel rod will hit your left side.

Error: Topping the ball or hitting the ground behind the ball

Correction: Maintain a constant grip pressure. If the grip pressure tightens during the stroke, excess tension is created in the forearms and shoulders, resulting in the club being lifted up and hitting the ball above its equator. Another factor that leads to this type of mishit is not maintaining the posture that was established at the start of the stroke. Raising or lowering the swing center (top of the sternum), will change the bottom of the arch, causing the club to strike the ground prior to striking the ball or striking the ball above the ball's equator.

Error: Failure to strike the ball while the club is in a descending angle of approach

Correction: Address the ball with 70% of the body's weight on the target foot, the ball just inside the heel of the nontarget foot and the hands at the midline of the body. If the hand/club head relationship that was established at the outset is maintained during the swing, the club head will never pass the hands.

Pitching

The pitch shot is used when there is a greater area or obstacle to negotiate between the ball and the green than can be accomplished with the chipping stroke. The pitch shot is normally performed with a more lofted club, such as a pitching, sand, or lob wedge. The pitching stroke has most of the same movement characteristics as the full swing; therefore, the pitching stroke will not be addressed here in detail as a skill in and of itself. However, there are several characteristics of the pitching swing that are different from the full swing. The club head does not travel as far back as the full swing, minimizing club head speed that can be generated and resulting in the ball traveling a shorter distance. In determining the width of the stance, the golfer should make sure the heels are inside the width of the shoulders. The pitch shot is one of the "scoring

shots"; therefore, it is important for the golfer to spend considerable time practicing this skill in order to determine the distance the ball will carry in the air when using different clubs and when taking the club back to various clock positions.

Common Errors and Corrections for Improvement

Error: Inability to synchronize the swinging of the club with body movements

Corrections: At the outset, allow the upper arms to rest on the sides of the chest. The backswing and forward swing are made by rotating the upper torso (large muscles). The club, hands, and arms move only because the upper torso turns back and through the shot.

Error: Inconsistency in hitting the ball a specified distance

Corrections: Practice using the "clock" method. Hit twenty balls by taking the club back to various clock positions. It is important that the address and ball position be consistent, allowing you to make contact with the ball in the same manner each time. Average the distance the 20 balls traveled from each clock position. This will provide you with the average distance that you can expect the ball to travel from different length backswings.

Error: Decelerating through impact

Corrections: The club head travels too far into the backswing and, as a result, golfers decelerate the club head as it approaches the golf ball. If you take the club to the 9 o'clock position in the backswing, the follow-through should be to the 3 o'clock position.

The Long Game

Thirty-five to forty percent of the shots taken in a round of golf are full swings. Because the ball is on the ground and several feet in front of the golfer for the full swing, it is both a rotary and up and down motion. As the backswing is initiated, the club head travels up and around the body, and as the forward swing is made, the club head travels down and around the body, striking the ball and ascending into the follow-through. Although golfers tend to think this is a complex move, it has many of the same mechanical characteristics of swinging a softball bat, only on a different plane, or tossing a heavy object onto the back of a truck. Individuals who play the game of golf are continually searching for "the" perfect swing. In observing the greatest golfers in the world, one can see that there are considerable differences in their swings, yet they all play exceptionally well. The one thing that can be seen in common among great players is that they seem to look alike at the time the club face is impacting the ball, albeit they get there in different ways. Therefore, it is not "the" perfect swing the golfer should be trying to learn but the swing that works best for him or her.

Full Swing

Grip

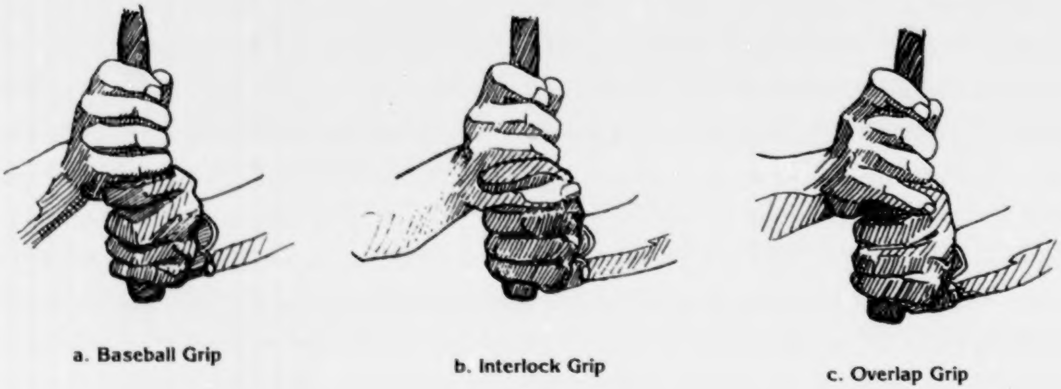
The hands are the only part of the body that contact the club, and the club is the instrument that contacts the ball. The grip has a major influence on the relationship of the club face to the swing path at impact, thus affecting the direction the ball will travel. The three basic ways of gripping the club for the full swing include the baseball grip, the interlock grip, and the overlapping grip (see Figure 7). The grip selected should be one that allows both hands to act as one, with no slippage, and provides the best opportunity to return the club face square to the target line at impact. In each of the grips, this is best achieved by having the last three fingers of the left hand cradle the grip of the club underneath the heel pad (see Figure 8a). The grip pressure should be light or firm but never tight. The right hand cradles the grip in the middle joints of the fingers, with the lifeline of the right hand covering the thumb of the left hand (see Figure 8b). Because one of the primary objectives of golf is to develop consistency in performance, the individual should develop a routine for placing the hands on the club precisely the same way every time the club is gripped for a standard shot.

Aim and Setup

The setup puts the golfer in a position to make an athletic move. This move, depending on the golfer, allows as much as 4 horsepower to be generated with a club head speed of over 100 mph. It is important that the setup permits the entire body to move freely. The more consistent the setup, the more opportunity there is for the golfer to make a consistent swing. The setup is always taken as it relates to a target. The following steps are suggested for achieving an efficient setup.

- *Aim/Alignment.* Establish a desired target where you wish to direct the ball. Set the bottom edge of the club face perpendicular to an imaginary line to this target. The feet are perpendicular to the target line, and the hips, shoulders, and eyes are parallel to this line.
- *Stance.* The feet should be about shoulder width apart for a full swing.

Figure 7. Full-Swing Grips

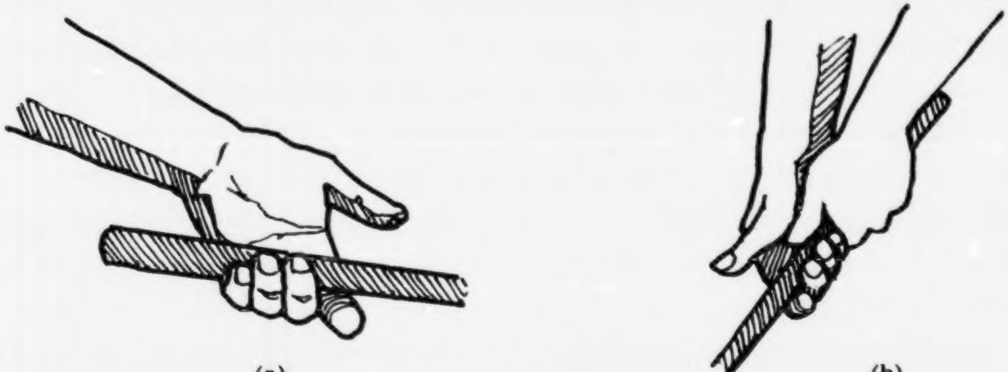

a. Baseball Grip

b. Interlock Grip

c. Overlap Grip

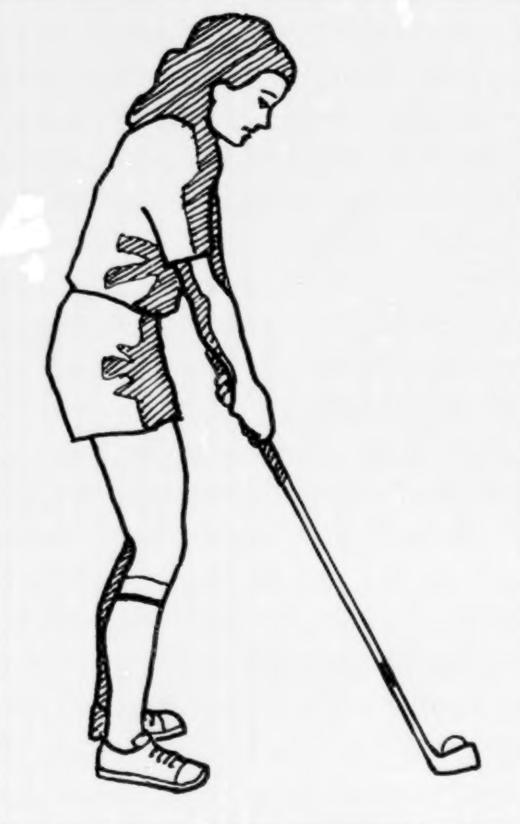
- *Weight distribution.* From left to right, the weight should be distributed with approximately 40% of the weight on the target foot and 60% on the nontarget foot. Distributing the weight in this manner, with the right hand being lower than the left hand on the shaft, will result in the head being positioned slightly behind the ball. From front to back, the weight should be centered over the middle of both feet, with more weight on the balls of the feet. (Hint: it should be easier to tap the heels than to tap the toes.)
- *Posture.* With the back and legs straight, begin tilting the upper body at the hips. At the point you begin to feel that you are losing your balance, flex your knees to gain stability. This will result in the spine being tilted at about a 20-25 degree angle. The arms and hands should be relaxed and hanging freely from the shoulders, angled slightly out toward the ball (see Figure 9).
- *Ball Position.* The distance the ball should be away from the golfer is determined by taking a good posture and by the length of the shaft of the club (farther away for fairway wood, closer for a pitching wedge). The arms should hang comfortably down and slightly out from the shoulders (do not reach). There are two schools of thought regarding the left to right position of the ball in the stance. One that may be easiest to remember for the beginning golfer is keeping the ball in a constant position to the left foot (about 2-3 inches inside the left heel). Placing the right foot at varying distances from the left

Figure 8. Hand Placement Full-Swing Grip


(a)

(b)

Figure 9. Full-Swing Posture



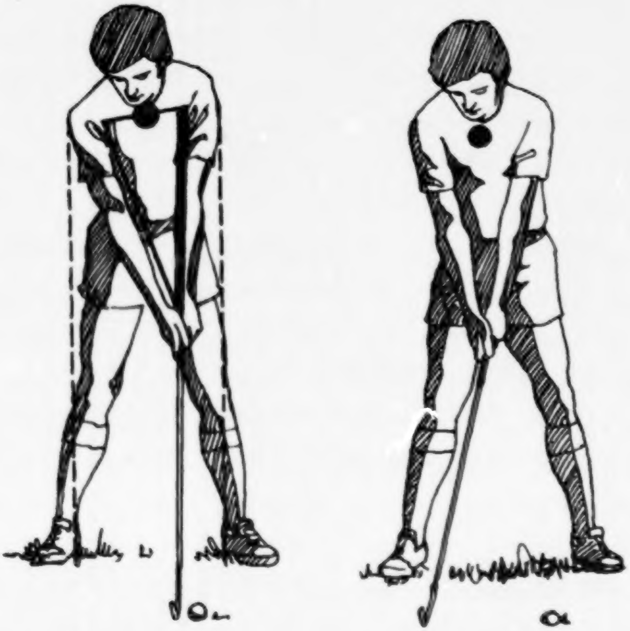
foot will affect the location of the ball in the stance (front, center, back). For example, if the ball is 3" off the inside of the left heel and the right foot is 6" from the left foot, the ball will be in the center of the stance. This would be the appropriate ball location for hitting a pitching wedge a short distance. Each time a longer shafted club (9, 8, 7) is selected, the right foot moves away from the target about the width of the golf ball. In doing this, as the club shaft gets longer, the stance becomes wider and the ball will be more in front of the stance for longer shafted clubs. The other method of ball placement includes having a variable ball position with some adjustment in the width of the stance. Using this method, feet about shoulder width apart, the ball starts in the center of the stance for a pitching wedge and is moved forward in the stance 1/2 the width of the ball as the shaft of the club becomes longer (i.e., 9,8,7,) to where the ball is just inside the left heel for the driver and fairway woods.

In-Swing Fundamentals

The full swing is a continuous motion in which the body parts must work sequentially to produce a rhythmical and flowing motion. The various stages of the full swing are illustrated in Figure 10a-h. Starting with a good grip, aim, and setup, the golfer is ready to initiate the swing (see Figure 10a).

- The triangle formed by the arms and chest must stay in sync. This allows the club to stay in front of the upper torso at all times during the swing.
- There should be no attempt by the golfer to rotate the hips to the right. If the muscles of the body are relaxed, this will occur naturally as the club is taken to the 9 o'clock position (club parallel to the ground and target line). At this point in the swing, most of the body's weight will have shifted to the inside of the nontarget foot, and both arms should be extended (see Figure 10c).
- From the 9 o'clock position, the shoulders rotate up and around the body. The hinging of the wrists begins during this move, and at the top of the swing, when the hinging of the wrists is complete, the left arm and club shaft form the letter "L." Depending on the length of the swing needed for the desired club head speed and one's flexibility, the hands may travel to the 11 o'clock position for a full swing (see Figure 10d).
- As the shoulders stop turning and the club is now in the desired position in the backswing, the golfer initiates the forward swing by moving the target knee to the left and making a slight movement (sometimes referred to as a bump left) of the left hip towards the target. After the "bump" left with the hips, the hips begin to rotate. This movement results in the body's weight being shifted to the left foot; it is this move that initiates downward movement of the arms and club toward the ball. The transition between the end of the backswing and initiating the forward swing is considered to be one of the most important moves in the golf swing, as well as the most challenging one to learn.
- When the left knee and hips begin movement, the left arm should remain extended and the golfer should feel that the arms are basically

Figure 10. Full-Swing Stages

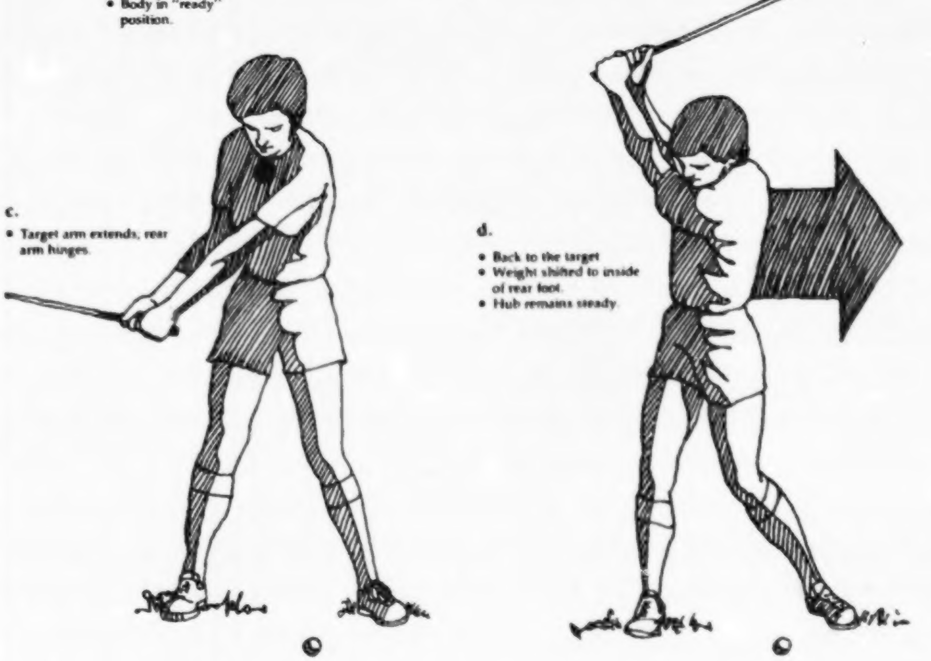


a.

- Feet shoulder width apart.
- Ball forward of center in stance.
- Body in "ready" position.

b.

- Takeaway sequence: hands-arms-shoulders.
- Hub steady and behind ball.



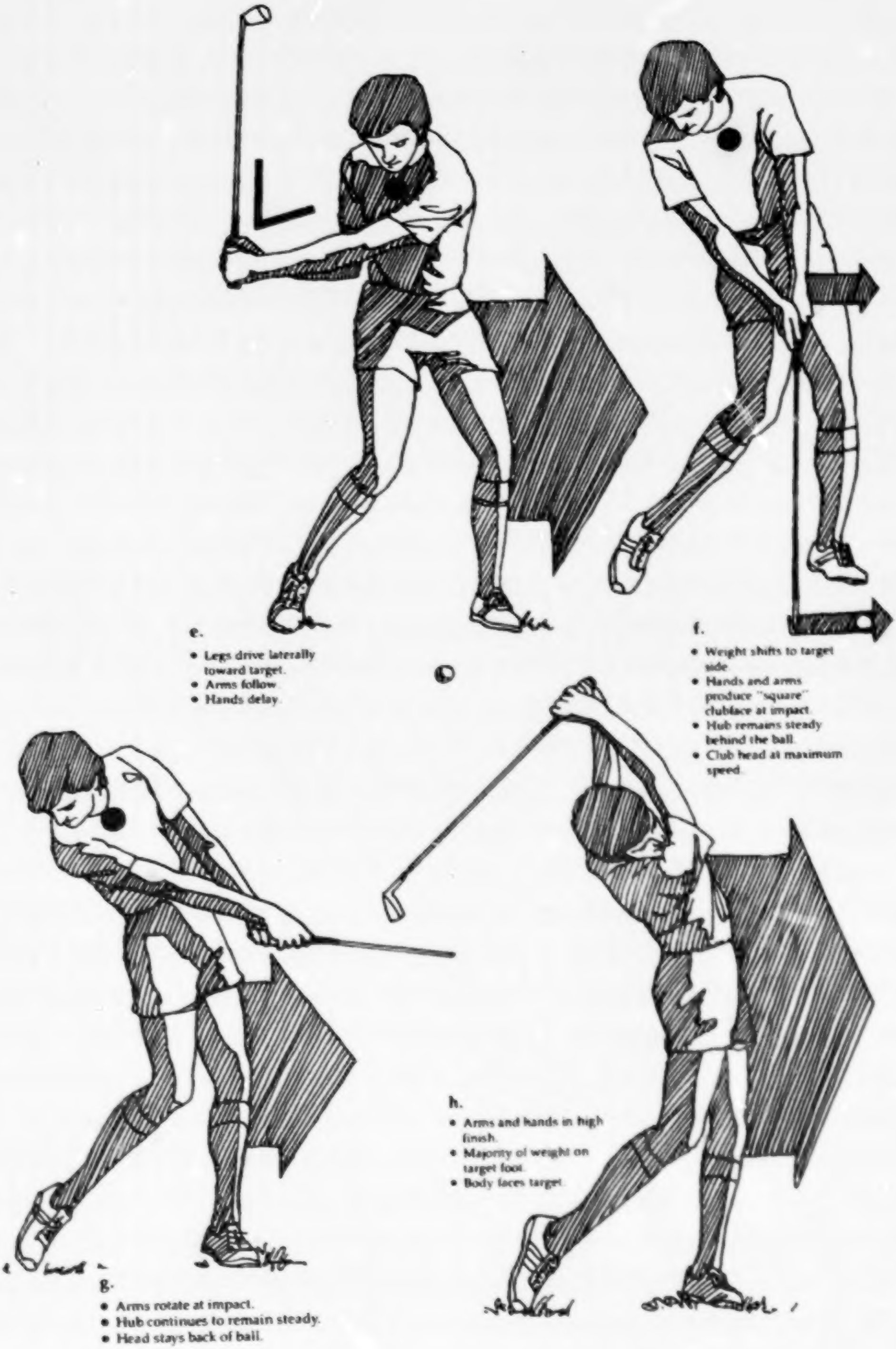
c.

- Target arm extends; rear arm hinges.

d.

- Back to the target
- Weight shifted to inside of rear foot.
- Hub remains steady.

Figure 10. Full-Swing Stages (continued)



e.

- Legs drive laterally toward target.
- Arms follow.
- Hands delay.

f.

- Weight shifts to target side.
- Hands and arms produce "square" clubface at impact.
- Hub remains steady behind the ball.
- Club head at maximum speed.

g.

- Arms rotate at impact.
- Hub continues to remain steady.
- Head stays back of ball.

h.

- Arms and hands in high finish.
- Majority of weight on target foot.
- Body faces target.

"free falling" down and around the body towards the ball.

- As a result of the centrifugal force being generated in the downswing, both arms will be extended at impact and, in the initial follow-through, will be extended to the 3 o'clock position (mirroring the 9 o'clock position in the backswing).
- At the 3 o'clock position, the arms begin to fold, and the hands will travel to a high finish (1 o'clock). At this point, the body has turned completely through the shot, with the midsection of the body facing the target, and 90% of the body's weight should be on the left foot.

Common Errors and Corrections for Improvement

Error: "Topping" the ball. A topped shot is when the club strikes the ball above its equator, resulting in the ball rolling on the ground. Naturally, the ball does not travel far, and the loss of distance will vary according to the terrain (hard ground, long grass, uphill, downhill, etc.). One of the major causes of "topping" the ball is raising the swing center, which, in turn, raises the club head. Also, when the body moves laterally towards the target, this will cause the club to have an exceptionally steep angle of approach to the ball.

Correction: There are several factors that need to be considered to avoid topping the shot, all of which allow the club to return to an appropriate impact position. The knee flex and spine tilt established at address must be maintained until after impact, eliminating the raising and lowering of the body's swing center. At the address position, the head should be slightly to the right of the ball and should remain in this position until after impact. Maintaining the position of the head behind the ball eliminates lateral movement of the body toward the target.

Error: "Hitting behind the ball" causes grass or dirt to get between the ball and the club face, resulting in a loss of distance. The downswing is initiated with the arms and hands with little assistance from the lower body. Therefore, the bottom of the arch of the downswing is behind the ball. Also, lowering the swing center during the downswing can result in the club striking the ground before striking the ball.

Correction: Start the downswing with the left knee and hip moving slightly toward the target, allowing this movement to initiate the downswing of the arms.

Error: "Slicing" is when the ball curves severely to the right of the target. "Hooking" is when the ball curves severely to the left of the target. The reason a ball curves is that the club face is not perpendicular to the path the club is traveling at impact. If the face of the club is open (toe of the club is trailing the heel) relative to the path the club is traveling at impact, the ball will curve severely to the right. If the face of the club is closed (heel of the club is trailing the toe) relative to the path the club is traveling at impact, the ball will curve to the left. In all shots, the ball will start on the path the club is traveling and, based on the open or closed club face, will begin to curve thereafter. Excessive grip pressure and lateral movement toward the target during the downswing causes the club to lag behind the golfer's body, which will result in an open club face at impact, leading to a ball flight that curves left to right (slice). When the hips stop rotating and the shoulders continue to turn, this causes the club face to close, resulting in a ball that curves to the left.

Correction:

- Curing the "slice." As the body rotates, hold the club with a very light grip pressure that will allow the club face to square up to the path at impact. The downswing is initiated with a slight bump to the left (not lateral movement), then the body rotates.
- Curing the "hook." The downswing is initiated with the lower body, followed by the upper body. The lower body (hips), after making a slight bump left, must continue rotating all the way into the follow-through. This move initiates the shoulder turn through and allows the shoulders to be parallel to the target line at impact. If the lower body stops rotating and the shoulders continue to turn, it will cause the club face to be closed to the swing path at impact.

Golf Etiquette

Golf has a recommended code of behavior for participants and an expectation of the players to help keep the golf courses in the best possible condition for other players. These behaviors and expectations are called golf etiquette. Golf etiquette is intended to help everyone enjoy the game, to keep play moving on the course, to encourage safety, and to protect the course from unnecessary damage.

Examples of golf etiquette are as follows:

1. When any player is preparing to hit, including players in your group, as well as players within hearing distance of you, you are expected to remain silent and motionless. This also applies to spectators at golf tournaments.
2. If your group cannot keep up with the group playing in front of you, and the group behind you is waiting to hit their shots, step aside and permit the group behind you to play through.
3. Help playing partners and opponents find their golf balls that are hit into hazards.
4. Keep your golf bag and cart off the teeing areas and greens.
5. Replace divots (pieces of turf) that are cut from the playing surface.
6. Repair ball marks on the green.
7. If you are required to hit a ball from a sand trap, rake the sand trap when you leave.
8. Be sure no one is in front of or behind you when you are swinging a golf club.
9. A player should not hit until all players in front of him/her are safely out of his/her hitting distance.
10. The warning cry "fore" should be yelled if a ball is heading in the direction of other players. If you hear the word "fore," turn your back to the direction from which the yell was heard and cover your head with your hands and arms.

The Game of Golf

Courses

Golf courses are composed of 9 or 18 holes, and each course is different in appearance, length, terrain, and difficulty. A course has unique characteristics that reflect the design of different golf course architects. Just as an artist paints different pictures, an architect designs each hole with its own unique characteristics. The holes vary in the type of hazards or obstacles (water, sand, and trees), the length of the hole, the size of the green, and the contour of the playing surface. The courses may vary from flat to extremely rolling terrain. Some courses have very few trees and bushes, whereas others are "cut out" of a forest of trees.

One of the factors that makes golf such a challenging sport is the fact that holes on a golf course are different which makes each golf course unique in its design. Figure 11 is a drawing of a golf hole with the respective parts of that hole identified.

Figure 11. Golf Course

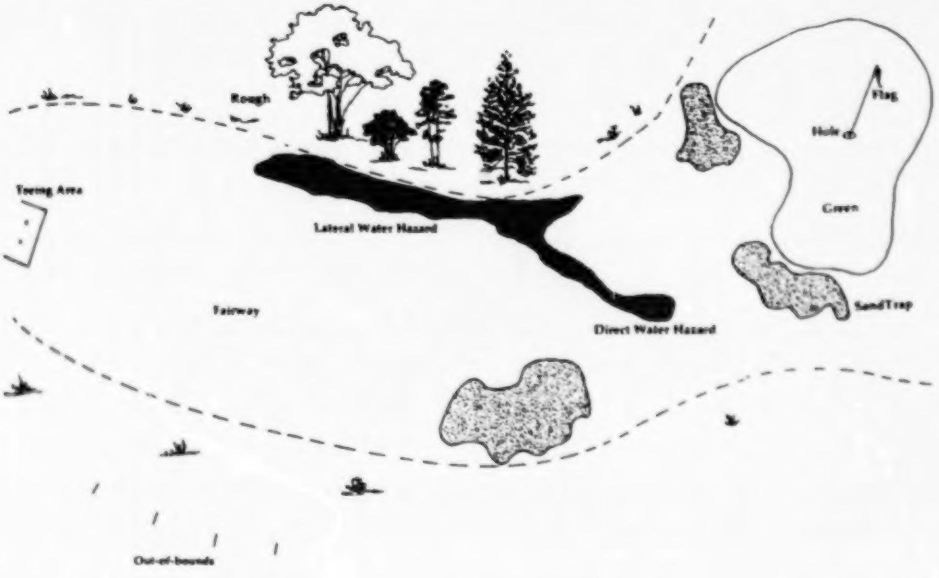


Figure 12. Score Card

Yardage	510	326	137	365	342	160	490	362	382	3074	325	380	485	130	365	290	500	151	351	2975	6049
Handicap	1	13	17	7	11	15	3	9	5		12	6	4	18	8	14	2	16	10		
Par	5	4	3	4	4	3	5	4	4	36	4	4	5	3	4	4	5	3	4	36	72
Hole	1	2	3	4	5	6	7	8	9	Front	10	11	12	13	14	15	16	17	18	Back	Total

Scoring

The objective in golf is to get the ball from the teeing area into the hole on the green with the fewest number of strokes possible. The total number of strokes taken on the hole is recorded as a score for that hole. At the end of the 9 or 18 holes, the scores for each hole are added for a total score for the round.

To make scoring easier, a scorecard is provided at golf courses. A sample scorecard is illustrated in Figure 12. Note the term *par* on the scorecard. Each hole has a designated par, which is the established stroke standard for that hole. Par is determined by the length, the design, and the difficulty of a hole. Regardless of the length or difficulty of a hole, two strokes are allocated for putting. Generally, an 18-hole course is designed to have four par 3 holes, ten par 4 holes, and four par 5 holes. On the model scorecard, par on the first 9 holes (called the front side) is 36 and par on the last 9 holes (called the back side) is also 36. Par for the entire course is 72.

The term *handicap* on the scorecard is merely a numerical rating of the respective 18 holes on the golf course. The handicap hole rated number 1 is considered to be the most difficult of the 18 holes on the golf course. In turn, the handicap hole number 18 is considered the easiest hole on the course. This rating is useful when players of unequal ability are competing against each other and using some form of a handicapping system.

Rules

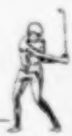
To give order and direction to the game of golf, rules were established. As in other sports, situations arise during play that may or may not invoke penalties. The rules of golf are established by the United States Golf Association (USGA), the ruling body of golf in the United States. The rules govern situations on golf courses that are direct results of the actions of a player in attempting to hit the ball, the end results of hitting the ball, or the conditions of the course over which the player has no control.

An understanding and knowledge of the rules help players to make accurate decisions in situations that require an interpretation of the rules during a round of golf. The most stringent penalty is disqualification, which may occur in certain situations in competition. Most rule violations result in one or two penalty strokes (in stroke play competition) or loss of hole (in match play competition).

The rules of golf are intended to govern tournament competition. It is imperative that all players competing in a respective tournament play by the same rules. Tournament directors, club professionals, and tournament committees may make exceptions to the rules of golf because of playing conditions and/or the ability levels of the competitors.

Basic Rules that All Golfers Should Know

1. When starting a hole, you are permitted to place the ball on a tee (a wooden or plastic peg designed to hold the ball off the ground) within an imaginary rectangle formed between the two tee markers and a two-club length distance behind the markers. Your feet may be placed outside the rectangle as long as your ball is within the imaginary boundaries of the rectangle area. The penalty for hitting your ball from outside the designated area is as follows: In stroke play, the player incurs two penalty strokes and must play a ball from within the teeing ground. In match



play, the player's opponent may immediately require that the shot be replayed within the teeing area without penalty.

2. When a ball comes to rest out-of-bounds (boundaries are marked with white stakes or boundary fences), the penalty, in both stroke and match play, is loss of distance (return to the spot of the previous shot and continue to play), and the player incurs a penalty of one stroke.
3. A ball is declared lost when it comes to rest within the boundaries of the course, outside a hazard, and is not found within a five-minute time limit. The penalty, in both stroke and match play, is loss of distance (return to the spot of the previous shot and continue play), and the player incurs a penalty of one stroke.
4. When a player hits a ball into a water hazard (marked by yellow stakes), the player may play the ball where it lies in the hazard without penalty or choose one of the following, incurring one penalty stroke: (a) Play a ball as nearly as possible at the spot from which the original ball was last played; or (b) Drop a ball behind the water hazard, keeping the point at which the original ball crossed the margin of the water hazard directly between the hole and the spot on which the ball is dropped, with no limit to how far behind the water hazard the ball may be dropped; or (c) Choose additional options if the ball last crossed the margin of a lateral water hazard (marked with red stakes). If this happens, drop a ball outside the water hazard within two club lengths of and not nearer the hole than (1) the point where the original ball last crossed the margin of the water hazard or (2) a point on the opposite margin of the water hazard equidistant from the hole.
5. You may move your ball, without penalty, from man-made obstructions such as permanent benches, drinking fountains, and buildings on the course property. You are entitled to a free drop within one club length from your nearest spot of relief (stance and swing). Moveable obstructions such as ropes, hoses, and rakes may be moved without penalty.
6. You are entitled to a free drop within one club length from your nearest point of relief if your ball comes to rest in ground under repair, casual water, or a wrong putting green, or if it is embedded in its own pitch mark in your fairway.
7. If your ball comes to rest in a sand bunker, you are not permitted to touch the sand with your club until your downswing through the ball. Penalty: in stroke play, two strokes; in match play, loss of hole.
8. If you putt your ball from the putting surface and it hits another player's ball also on the putting surface, you are assessed a two-stroke penalty in stroke play or the loss of that hole in match play.

Except for the highest level of competitive tournaments, there are no officials in golf. Players are expected to enforce the rules on themselves and, when in doubt, to check with their opponents. Therefore, it is important to learn the rules because they can assist as well as penalize you.

Equipment

A set of golf clubs is composed of both "woods" and "irons." The term "woods" is used because these clubs were made of wood at one time. Today there are a few manufacturers that still make a wooden club, but, for the most part, these clubs are now made of metal. A more commonly used term used to describe these clubs is "metal woods." The maximum number of clubs that a player may carry is 14. However, this does not prevent a player from carrying fewer than 14 clubs. Individuals just starting to play will often have what is known as a "starter set" (3, 5, 7, 9 irons, #3 fairway metal wood).

Selection of Equipment

Clubs

Two considerations in selecting golf clubs are how the clubs fit the golfer and the cost. Having a club that fits the golfer is the first and most important consideration in selecting a club. Clubs may be purchased in different lengths and weights and with varying lie angle and shaft flex. Criteria that are considered when fitting an individual for clubs include the player's height, hand size, arm length, and the speed the player swings the club. In most cases, it is best for the golfer to be fitted by a club-fitting specialist.

The second consideration in selecting clubs is cost. New clubs may be very expensive, but the money invested may be well worth it. A set of clubs may last for many years. Used clubs may be purchased for

much less, and if they fit, are equally good for an individual to use.

Balls

If you watch television commercials regarding golf balls, it appears that every manufacturer of golf balls makes the best ball for you. The selling of golf balls is a very competitive business because golf balls are the primary "dispensable" item in the game of golf. If you play golf, you will lose golf balls, or you will cut or damage the cover to the point where the ball is virtually unplayable. Criteria to be used in selecting a golf ball includes, but may not be limited to, performance, feel as the ball is struck, and durability. Your golf professional and teachers can assist you in selecting golf balls to suit your game.

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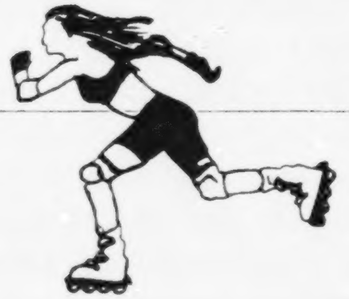
CHAPTER 13

Inline Skating



Chet Bunting
Cherry Drive Elementary School
Thornton, CO

Introduction

On April 22, 1823, Robert John Tyers of London designed the first inline skate by placing five wheels in a row on the bottom of a shoe. Stopping and turning were problematic and his invention was considered a novelty and not taken seriously. Forty years later, in 1863, J. L. Plimpton of New York created a four-wheeled skate using a pair of wheels in the front and the back, mounted on a plate with rubber pads for steering. Later, ball bearings were added into the wheels, and the steel wheels were replaced with composite wheels. These changes allowed the skater a much smoother ride. However, Mr. Tyers's crude inline skate did not go unrecognized. In the Netherlands, his skates were used when ice-skating was no longer feasible, as a means of dry-land cross training, competition, and transportation for over two decades. The inline idea finally made it to the United States in 1980.

The technology and equipment has vastly improved since its beginnings in the early 1980s. Scott and Brennan Olson of Minneapolis were looking for a means to train for ice hockey during those short periods when ice was scarce in Minnesota. They applied skateboard technology to a roller skate, with the wheels lined up in a single file. The traditional steel wheels were replaced with urethane wheels, and a heel brake was added. They called their new skates "rollerblades." The company was sold in 1984 to a Minneapolis businessman for $100,000. Due to its popularity, inline skating soon became nearly a billion-dollar industry. Rollerblade was later purchased by Benetton Sportsystem in 1991.

Inline skating, one of the most popular participant sports in the world, is enjoyed by more than 24 million skaters today. The participants range from cross-country skiers and hockey players who use inline skating as a form of cross training, to beginning enthusiasts skating leisurely around bike paths. Inline skating attracts adults seeking its high fitness and aerobic benefits, its low cost, and its accessibility. Inline skating as a form of exercise is as beneficial as running or cycling, according to Dr. Carl Foster, associate professor of medicine at the University of Wisconsin Medical School and coordinator of sports medicine and sports science for the United States Speed Skating Team. Unlike cycling, inline skating develops hamstring muscles, and unlike running, inline skating is a low-impact activity. During a 30-minute period (on the average for adults), inline skating burns 285 calories and produces a heart rate of 148 beats per minute.

Inline skating also attracts young people who seek the excitement of aggressive skating or inline hockey. Millions of people have found inline skating to be a great form of exercise and a healthy workout. Some of the benefits of skating include cardiovascular conditioning and muscle toning, particularly of the quadriceps, gluteus (buttock), and outer and inner thigh muscles.

Terminology

Some of the terminology found in this section was not used in the text. However, the author believes it is important to include terminology that the reader may be exposed to as he/she becomes a more proficient skater.

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ABEC. A scale, established by the Annual Bearing Engineering Council, that measures the precision of a ball bearing, with ratings of ABEC-1, -3, -5, and -7, with 7 being the most precise.

Aerobic endurance. Specific to the heart, lungs, and vascular system, aerobic endurance refers to the ability to perform numerous repetitions of an activity requiring considerable use of the circulatory and respiratory systems.

Aggressive. A type of skating where the emphasis is on stunts, performed either on street courses or specially built ramps or pipes.

Air. As in catching or getting air. Used when getting height from jumping from the ground, ramp, or pipe.

Anti-rockered. When two middle wheels are smaller than the front and back wheels on an inline skate, to allow for grinds and curbsides.

ASTM. American Standards for Testing Materials. Establishes standards for protective equipment. ASTM certified means the gear complies with certain design specifications for safety.

Axel. A figure skating word for when you do a complete half rotation.

Balance. Balance is the ability to maintain one's equilibrium in relation to the force of gravity in both static and dynamic movement situations. Balance is influenced by vision, the inner ear, the nerve endings around the joints (proprioceptors), and the skeletal muscles.

Bearings. Mounted in pairs in the hub of each wheel, these make inline skate wheels turn with nearly frictionless ease.

Black Ice. A smooth, recently paved street. This is an ideal surface for skating.

Blur. An unbelievably fast skater.

Brake. Device used to decrease velocity.

Carbs. An abbreviation for carbohydrates, which can be found in pasta, for example. It is best to load up with carbs before a race.

Center of Gravity. The point at which the entire weight of a body is centered. If this point were to be supported, the body would remain in equilibrium in any position.

Carving. Traveling and turning across the vertical face of a pipe.

Coping. The upper edge of a ramp where vertical meets a horizontal hanging, along which one can perform various tricks.

Crossover. Crossing your legs when making a turn.

Curbside. Sliding along a curb with skates perpendicular to the edge.

Diameter. The width of a wheel measured through its center, in millimeters (mm).

Drafting. Used in racing. When you are behind someone and are caught in their slipstream (the low-pressure air current created when the wind is blocked by a body and forced behind them).

Drifting. Traveling across the vertical wall of a pipe facing in the same direction.

Durometer. The measure of a wheel's hardness, on a scale from 0 to 100, with 100 being the hardest. Durometer is denoted by the suffix "A." E.g., 80A.

Fakey. Rolling backward down a half pipe after rolling forward up the half pipe.

Frame. Part of the skate that holds the wheels in place, also called the chassis.

Freestyle. Type of inline skating most similar to ice figure skating, also called artistic.

Glide. Similar to coasting but with propulsion. A particular time frame in the striding maneuver, when one stroke has finished and before another stroke is started.

Grind. To slide along a rail or other edge, using skate surfaces other than the wheels.

Grind Plate. A piece of metal or plastic affixed to the bottom of the skate frame between the middle wheels, which makes grinding possible.

Half Pipe. A U-shaped ramp on which skaters perform a variety of moves.

Inside Edge. The side of the wheel that is closest to the centerline of the body.

Invert. On a pipe when you are going straight up to a handstand and turning your body to come down.

Liner. The inner boot of a skate that cushions and supports the foot and ankle.

Outside Edge. The side of the wheel that is furthest from the centerline of the body.

Precision. The term used to describe non-ABEC-rated bearings.

Profile. The thickness and shape of a wheel.

Quads. Traditional roller-skates in which the wheels are mounted in pairs, as opposed to in line.

Quarter-Pipe. A ramp that is flat at the bottom and curves to form a vertical skating surface.

Ready Position. The stable body position that allows a skater to move in any direction.

Recreational. Casual, nonspecialized skating or skates.

Road Rash. The scrapes and burns that come from falling on unprotected flesh. This can be prevented by wearing full protective gear.

Rockering. When wheels on an inline skate are configured to simulate the curve of an ice-skate blade to enhance maneuverability by shortening the turning radius.

Rotary Motion. Turning around a central axis of the body.

Rotate. To switch the positions of inline skate wheels to prevent uneven wear and to increase the life of the wheels.

Snell. The foundation that tests and certifies helmets to a high standard.

Spacer. A plastic or aluminum hub that separates bearing casings.

Street. Skating on public thoroughfares, including jumping obstacles.

Striding. The combination of stroking and gliding in a continuous fluid motion.

Transition. The curved portion of a ramp that connects horizontal and vertical skating surfaces.

Vert. Short for vertical, refers to inline skating on ramps and pipes. Also refers to the riding surface in a quarter or half pipe that rises upward.

Weight Transfer. The shifting of weight from one skate to the other.

Fitness Requirements

Physical fitness has two aspects: health-related fitness and skill-related fitness. Inline skating activities require components from both health-related fitness and skill-related fitness.

Health-related fitness refers to those components of physical fitness that correspond to lifetime health. The components of health-related fitness as identified by the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) are 1) flexibility, 2) cardiovascular endurance, 3) body composition, 4) muscular strength, and 5) muscular endurance. These components are not as dependent on genetic factors as are the skill-related components and can be improved considerably by training

Skill-related fitness is also referred to as athletic or motor fitness. One's level of skill-related fitness will correspond to one's level of performance in sports and games.

The components of skill-related fitness are 1) agility, 2) balance, 3) coordination, 4) power, 5) reaction time, and 6) speed. A person's ability in these areas is partly determined by natural or inherited traits.

Flexibility, one of the health-related fitness components, should be included as a warm-up and cooldown to skating. The purpose of the warm-up is to elevate the heart rate slightly, increase the flow of blood to the muscles, and increase the temperature of the muscles to prepare them for exercise. Strengthening exercises and flexibility training can help all skaters decrease their risk and severity of injury, as well as improve their skill. It is important to improve the flexibility of all areas of the body. Pay particular attention to the muscle groups in the lower back region and to the groin, hamstrings, quadriceps, and the hips.

Prior to stretching any muscle group, spend 10 to 15 minutes warming up by walking or jogging to stimulate the flow of blood to the muscles. Tips for successful stretching:

1. Exhale while reaching.
2. Breathe normally while holding the stretch.
3. Inhale while releasing.
4. Hold the stretch (static) for a minimum of 30 seconds and repeat several times before and after skating.
5. Avoid locking the knees while stretching.
6. Never stretch to the point of pain. Stretch at a moderate intensity.

Illustrations for many of these stretches can be found in Chapter 1: Physical Fitness.

Neck Stretch

Tilt your head to the right until your ear is close to your shoulder. Hold for 30 seconds and repeat to the left side. Then lower your head until your chin is touching your chest and hold for 30 seconds. You may increase the stretch slightly by applying gentle pressure with one hand. Do not drop the head back as there is a possibility of pinching a nerve.

Hamstring Stretch

Sit on the ground in a straddle position and gently reach for your right foot with your knee relaxed. Hold for 30 seconds and repeat on the left side. Avoid locking your knee while performing this stretch. To increase the stretch, flex the foot on the side where you are reaching.

Hamstring Stretch

Sit on the ground with one leg out straight and bend

the other leg at the knee, resting the sole against the inner thigh of the straight leg. Your legs should make a figure four. Bend forward at the waist and grasp the foot of the straight leg. Stretch toward your straight leg, keeping the knee relaxed. This is a safe alternative to replace the hurdler's stretch. Hold for thirty seconds and repeat to the opposite side.

Groin Stretch

Sit on the ground with the bottoms of your feet together. Lean forward and gently pull yourself forward and down toward your ankles. Hold for 30 seconds and slowly roll up to a sitting position.

Hip Stretch

Sit on the ground with one leg extended and cross the other leg over, placing the foot on the ground next to the knee. Twist the upper body in the direction of the bent leg and balance on one hand behind you. Place the other arm on the outside of the raised knee. Hold for 30 seconds and repeat on the opposite side.

Lower Back Stretch

Lie on your back and raise your knees. Bending at the waist, pull both knees in to your chest until you feel a comfortable stretch. Leave your head flat against the ground. Hold the stretch for 30 seconds.

Abdominals and Back Stretch

On your hands and knees, with your eyes looking at your hands, tuck your hips under while contracting your abdominal muscles until your back is rounded; then release slowly until you have returned to the starting position.

Quadriceps Stretch (Thigh)

From a kneeling position on the ground, bring one knee forward while keeping the knee over top of the supporting foot. This position is called a knee-to-knee split. Gently lift the back foot with the hand on the same side while leaning forward. Hold for thirty seconds and repeat on the opposite side.

Quadriceps Stretch (Thigh)

Stand facing a wall with one hand against it for balance. Bend one leg at the knee and raise your foot up behind the buttocks. Hold the raised foot with your free hand and pull the foot toward the buttocks. Hold for 30 seconds and repeat on the opposite side.

Gastrocnemius Stretch (Calf)

Stand facing a wall with both hands against it for balance. Extend one leg behind (straight) and bend the front leg so that you end in a forward lunge position. Gently push the heel down on the rear leg. Hold for 30 seconds and repeat on the opposite side.

Strengthening exercises such as lunges, squats, calf raises, wall sits, and abdominal work are critical in a proper warm-up for inline skating. You can purchase elastic bands or surgical tubing from hospital supply stores to perform the exercises which require tubing. Illustrations for all of the strengthening exercises can be found in Chapter 1: Physical Fitness.

Steamboats

1. Place the tubing in a door four inches from the floor and around the left ankle. Place your right foot on a board.
2. Rapidly kick your foot out while keeping the tubing taut.
3. Change position as in the diagrams in Chapter 1.
4. Repeat 20-40 times in each position and then switch legs.

Resisted hip abduction with tubing

1. Stand sideways to a door.
2. Place the tubing around the ankle farthest from the door, with the opposite end secured in the doorjamb.
3. Extend the leg farthest from the door out to the side.
4. Repeat 20-40 times on each leg.

Wall sits

1. Back up to a wall and slowly lower your buttocks toward the floor until your thighs are parallel to the floor.
2. Hold 30 seconds to 2 minutes.
3. Tighten your thigh muscles as you return to the starting position.
4. Repeat 3-5 times.

Calf raises

1. Stand facing a wall with your feet facing straight ahead. Slowly rise up onto the balls of the feet and then slowly lower.
2. Perform one set of 15 repetitions.
3. Reposition the feet so your toes point in. Perform one set of 15 repetitions.
4. Reposition the feet so your toes point out. Perform one set of 15 repetitions.

Abdominal crunches

1. With your legs over a chair, couch, or footstool and your arms folded across the chest, tilt your pelvis and flatten your back onto the floor.
2. Raise your head and shoulders from the floor.
3. Repeat 40 times.

Balance is a component of skill-related fitness and is the foundation for becoming a proficient inline skater. Walking involves being in and out of balance. When you shift your weight from one foot to the other, it is referred to as transferring weight. The same principle holds true on wheels. Just as you learned how to balance when you learned how to walk, you must do the same on skates. Static balance is balance that is still or stationary, and dynamic balance is maintaining a balanced position while moving. Some activities that enhance balance are 1) balance boards, 2) fit balls, 3) yoga exercises, 4) balancing on equipment, and 5) gymnastics activities. The more practice that you have finding your center of gravity in both static and dynamic activities such as these, the more stable you will become on skates.

Skills

Practice all skill work on a high-friction surface such as grass, carpet, or mats in a stationary mode (static) and then a traveling mode (dynamic). Then progress to a low-friction surface such as pavement or flooring in a stationary mode and then a traveling mode. Some skills will require a considerable amount of practice time prior to mastery. Be patient and enjoy the process of learning.

Prior to skating, spend some time learning how to fall safely and properly in a grassy area or on mats. Always wear a helmet, wrist guards, kneepads, and elbow pads. Follow the progressions for each skill and always skate within your abilities. Spend considerable time mastering each of these techniques before attempting more advanced skills.

Falling

Perform this exercise in a grassy area without skates on. With all safety gear on and in a kneeling position, fall forward, taking weight on your wrist guards and then sliding into a prone position. Remember to keep your fingers up as you take weight on the wrist guards (see Figure 1). To stand up, place your right foot in front so that the knee is at a 90-degree angle, push down on the top of the knee, and stand up with your heels together and toes out (see Figure 2). This will be the same progression once you are wearing skates. Practice this maneuver until it becomes automatic and then try it from a standing position, collapsing and contacting the ground with kneepads first. Once you feel confident in the grass, try this exercise on a hard surface such as a floor or pavement. Now you are ready to put on your skates and perform the same progressions in grass and on a hard surface. Remember to always put the brake foot out in front of you when attempting to stand up on skates.

Figure 1. Falling from a Kneeling Position

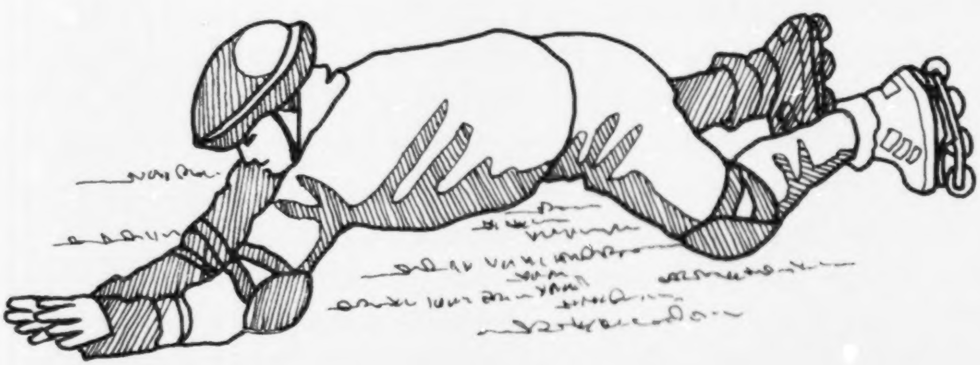
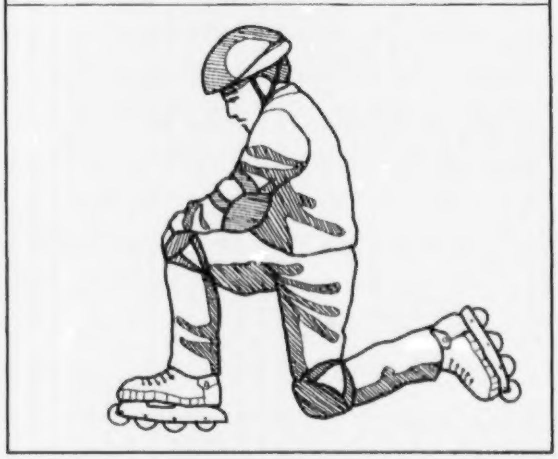


Figure 2. Getting up from a Fall



Stationary ready position

Perform this exercise on grass or a matted area.

1. Skates should be shoulder width apart.
2. Relax and bend at the ankles, knees, and hips.
3. Keep hips directly over the skates.
4. Keep arms extended in front for balance.
5. Head up with eyes focused in front of you.

Ready position with movement

When skates are put on initially, you will feel a bit awkward. One reason for this is that your center of gravity has been changed, and your muscles are straining simply to keep you from falling over. The purpose of these exercises is to help you relax and transfer weight from one skate to another while maintaining your balance. Beginning skaters have a tendency to stand up straight when they are about to fall. Practice lowering your center of gravity while practicing these stationary exercises. Perform these exercises on grass or a matted area (see Figure 3).

1. Assume a ready position.
2. Flex (bend) at the knees.
3. Lower your hips until the thighs are almost at a 90-degree angle.
4. Extend (straighten) at the knees.
5. Repeat this movement several times, keeping your eyes focused in front of you.

Transferring weight (walking)

1. Assume a ready position (toes forward).
2. Walk in place, transferring weight from skate to skate.
3. Walk skates laterally (sideways), stepping on one skate and then the other.
4. Walk skates forward.
5. Walk skates backward.

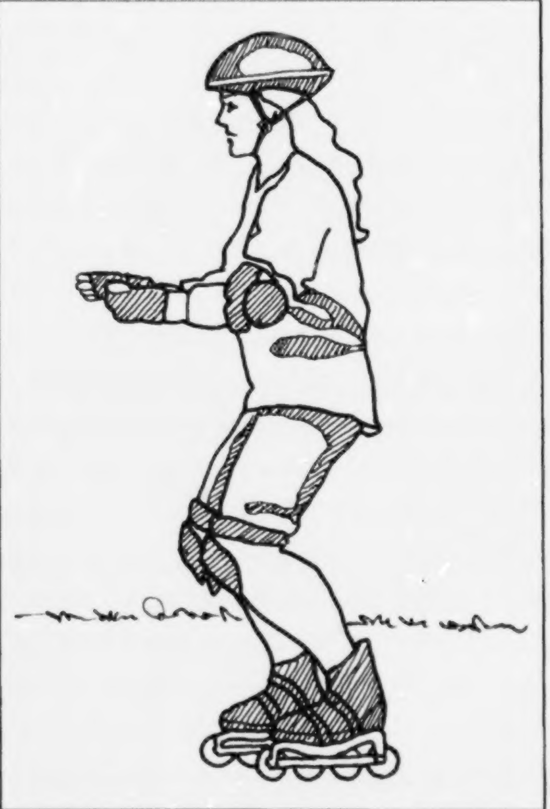
A-frame stance

1. Assume a ready position.
2. A-frame (toes in and heels out).
3. Shift weight in place from one skate to another.
4. Walk skates laterally, stepping on one skate and then the other.
5. Walk skates forward.
6. Walk skates backward.

V-frame stance

1. Assume a ready position.
2. V-frame (toes out and heels in).
3. Shift weight in place from one skate to another.
4. Walk skates laterally, stepping on one skate and then the other.

Figure 3. Ready Position



5. Walk skates forward.
6. Walk skates backward.

Braking stance

1. Assume a ready position.
2. Scissors skates with right in front in place.
3. Scissors skates with left in front in place.
4. Scissors skates with the braking skate in front.
5. Shift weight to the rear skate.
6. Apply pressure into the ground by transferring weight to the brake (braking stance) (see Figure 4).

Finding your edges

1. Assume a ready position.
2. Shift your weight slightly with bent knees until your outside edges have made contact with the ground.
3. Repeat on the opposite side.
4. Repeat in an A-frame stance.
5. Repeat in a V-frame stance.

Rotary motion awareness

1. Assume a ready position.
2. Turn the upper body (not hips) in both directions.
3. Turn the upper body, including the hips, in both directions.
4. Turn the hips (not the upper body) in both directions.
5. Scribe an arc with the outside edge (both legs).
6. Scribe an arc with the inside edge (both legs).

When you feel confident performing the above skill movements in grass, advance to a harder surface such as wood or pavement. Be certain that the area is free from obstacles such as rocks, sticks, holes, and other hazards.

Movement I

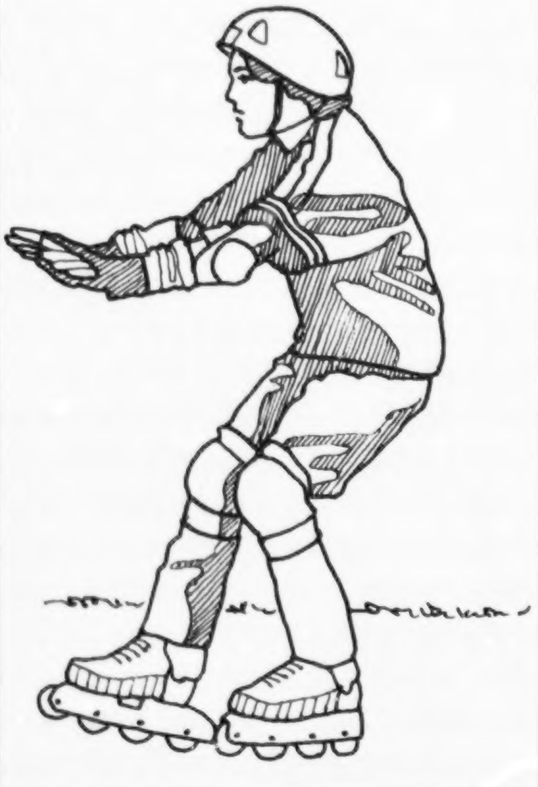
The goal here is to create forward movement and balance while moving (dynamic balance).

1. Assume a ready position.
2. V-walk in place on the grass.
3. V-walk and coast in the ready position on pavement.
4. V-walk to a coast and scissors skates back and forth.
5. Increase step length and spend more time gliding on each foot.
6. Combine the stroke (push) and glide (coast with a weight transfer). This movement is called striding.
7. Bring stroking leg under the hips each time.
8. Arms swing in opposition to the side. This will become more natural as you become more proficient with striding. Pay more attention to your feet at this time.
9. Keep your weight forward.
10. Practice the motion of striding by stroking and gliding.

Stopping

The goal here is to execute a heel brake stop from a ready position. The brake allows you to control your speed in various environments. Remember that an extended length stance (one foot ahead of the other) is a more stable stance.

Figure 4. Braking Stance



1. Assume a ready position.
2. Scissors skates back and forth.
3. Balance on one skate.
4. Scissors braking leg forward.
5. Shift your weight to the rear skate and lower your bottom.
6. Lift the toe of your braking skate until you feel the pressure on the brake.

Coasting to a ready position

1. Assume a ready position.
2. Focus on hand position.
3. Focus on knees, ankles, and hips.
4. Stride and coast to a ready position.
5. Scissors brake foot in front.
6. Transfer weight to rear skate.
7. Apply light pressure to the brake with no intention of stopping.
8. Apply more pressure and repeat until you come to a stop.
9. Practice this exercise until you can coast and stop in a shorter distance. Mark a five-yard stopping zone with cones or chalk. Coast until you come to that zone and apply the brake for a controlled stop. See if you can come to a complete stop within the zone.
10. Practice the above exercise from a variety of speeds.

Turning

The goal here is to execute an A-frame turn and change direction.

1. Assume a ready position.
2. Move to a wide A-frame stance.
3. Keep weight on the inside edges.
4. Stroke and coast in an A-stance with skates on two inside edges.
5. Point shoulders and hips in the direction of the turn.
6. Repeat this sequence in the opposite direction.
7. Repeat this sequence alternating right and left turns.

You will find that you naturally prefer to turn in one direction. Spend time practicing turning in the direction that gives you more difficulty. Turning proficiently in either direction will be a foundation for more advanced skating.

Movement II

The goal here is to increase the length of the stride and improve balance in motion.

1. Assume a ready position with increased knee bend.
2. While stationary, lower weight.
3. While stationary, apply more pressure to the stroke while focusing on the inside edge of the stroking leg.
4. While stationary, increase the length of the stroking leg.
5. Glide, stroking only with the right foot.
6. Glide, stroking only with the left foot.
7. Combine movements using alternating stroke.
8. Focus on the length of the glide.

Movement (advanced)

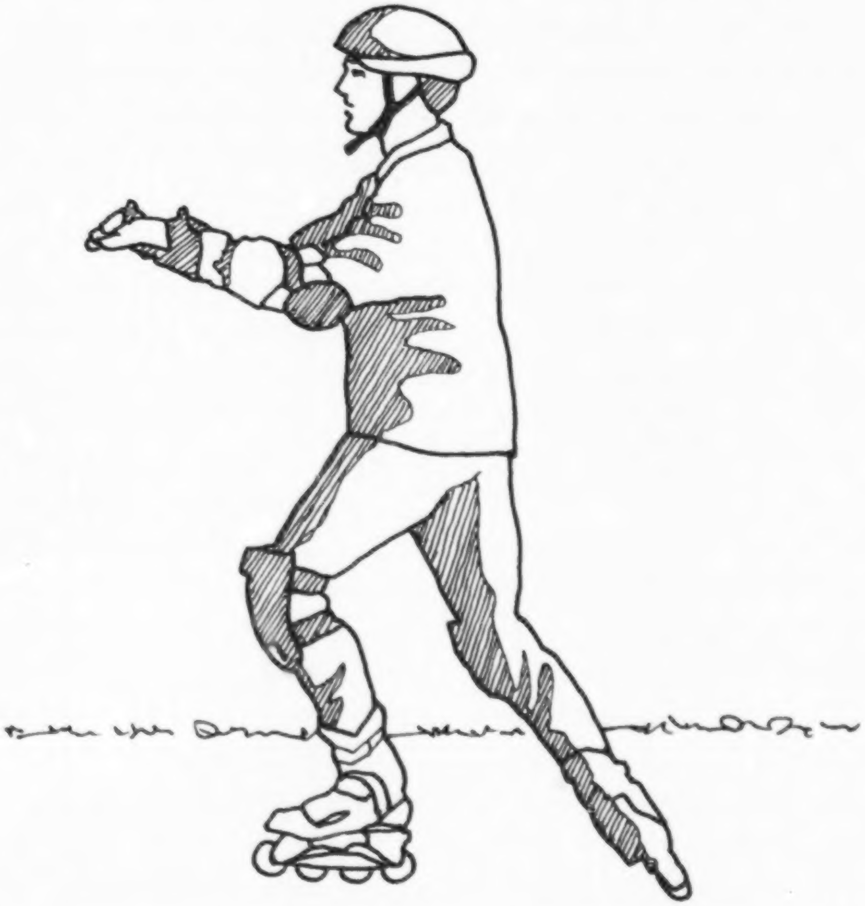
This movement is referred to as sculling or swizzling. The goal here is to create forward movement when space is limited. This is also an excellent fitness exercise for working the inner and outer thigh muscles.

1. Assume an A-stance.
2. Raise and lower your center of gravity in this stance.
3. Assume a V-stance.
4. Raise and lower your center of gravity in this stance.
5. From a V-stance, using the inside edge of your wheels, let both skates glide out evenly until your skates are just beyond your shoulder line.
6. Using the momentum of your outward glide, pivot on your heels and point your toes and knees in. While doing this, start to pull your feet together again until they are back into their original position.
7. Combine V-stance and A-stance to a ready position.
8. Connect swizzles.
9. This skill may also be performed while using one foot at a time. This exercise will allow you to stride more efficiently.

Stopping (advanced)

The T-stop and Y-stop will improve and add to your stopping skills. However, these are more advanced

Figure 5. T-Stop



stopping skills; the heel stop should be mastered prior to attempting these skills.

T-stop

1. Assume a ready position on the grass.
2. Lift the right skate behind the left skate at a 90-degree angle, forming a "T".
3. Practice this same movement on pavement.
4. From a coast, slowly lift the right braking foot.
5. Slowly drop the wheels until contact is made with the surface.
6. Come to a controlled stop (see Figure 5).

This method of stopping will increase the wear of the inside edges of your wheels.

Y-stop or spin stop

1. Review the A-frame turn.
2. From a coast, bend your left knee and ankle forward.
3. Shift your weight to the left skate.
4. Move the right skate behind the left skate at a 45-degree angle.
5. Apply downward pressure (inside edges) to the wheels on your right skate.
6. Allow your left skate to turn to the right so that your body pivots around the right skate.
7. Repeat this sequence in the other direction.

Turning (advanced)

The extended length stance is the key to successful

turns. When coasting with one skate in front of the other, the front skate will lead you in the turn. The right skate leads for a right turn and the left skate leads for a left turn.

Parallel turn

1. From a coast with the right foot in front, point your shoulder in the direction of the turn.
2. Focus on the inside skate's (left) outside edge.
3. The inside leg is the support leg.
4. Repeat the sequence in the opposite direction.
5. Remember that if you want to make a right turn, the right foot has to be in the lead.

Crossover turn

1. From a coast, push out with your right skate, shifting your weight onto the left skate. Make sure the left knee is bent.
2. Lift the right skate off the ground and, with control, slowly swing your right leg out, point your toe, and cross over your left.
3. Place your right skate down flat to an outside parallel.
4. Immediately upon touching the ground, shift your weight onto your right foot and lift and recover your left foot to a parallel roll
5. Practice on the opposite side.

Many beginners have a tendency to cross over with their heel leading the crossover foot. This usually results in the skates getting tangled. Always point your toe in the direction of the turn so your skate will land parallel. Crossover turns can be executed at any time during a turn. Remember the fundamentals you have previously learned.

Traversing hills

Traversing hills is a way to control your speed when descending. It is a skiing technique, which consists of making right and left turns across a hill instead of traveling straight down it. Control your speed at the top. Traversing allows you to slow down your descent. Skate across the hill and then make a U-turn and go back across it in the opposite direction.

Skating backward (advanced)

There is no effective way to stop when going backward due to the brake being on the heel of the skate. The two-step turn is a natural way to turn from back to front. While skating backwards, look over your right shoulder and pivot your right leg out from the hip so your right skate points behind you. Bring your left leg around in front to meet with your right. You are now facing forward and can execute your choice of braking.

1. Stand with your back facing the direction you want to go.
2. Assume a balanced position.
3. Move skates into an A-frame position.
4. Push skates out until they are about 3 feet apart.
5. Bring skates back together.
6. This technique is similar to sculling (introduced earlier in this chapter). The pattern that the skates are making looks similar to an hourglass.
7. As you become more proficient with this technique, you can practice a slight variation. As your skates come together in the hourglass technique, allow them to cross one behind the other. You will now be creating a figure-eight pattern instead of an hourglass. This technique will allow you to put more power into your stroke.

C cuts

1. Similar to sculling with one foot as discussed previously in sculling and swizzling.
2. Stand with your back facing the direction that you want to go.
3. Scribe a giant C with one skate, using the inside edge.
4. Return to the starting position.
5. Scribe a giant C with the opposite skate.
6. Return to the starting position.
7. Practice C cuts with the right skate only.
8. Practice C cuts with the left skate only.
9. Combine hourglass technique with C cuts.

Turning forward to backward (advanced)

1. Coast forward in a ready position.
2. Transfer weight to the right skate.
3. Lift the left skate and pivot.
4. Match up with the other skate.
5. Coast backward.
6. Repeat to the opposite side.

Turning backward to forward (advanced)

1. Coast backward in a ready position.
2. Transfer weight to the right skate.

3. Lift the left skate and place forward.
4. Lift the right skate and place beside the other skate.
5. Coast forward.

See Figure 6 for a self-assessment of inline skating skills. Start at the top and work your way down the list. Keep a record and put a date by each skill when it is achieved. To demonstrate achievement, the skill should be fluid, consistent, and automatic. Once you have achieved the skills, combine or link skills into sequences in order to improve technique and add variety to your workout.

Safety Concerns

The following Rules of the Road were developed by the International Inline Skating Association. Obey these rules whenever you skate.

- Always wear safety equipment: wrist guards, knee and elbow pads, and a helmet.
- Stay alert and be courteous at all times.
- Control your speed.
- Skate on the right side of paths, trails, and sidewalks.
- Overtake other pedestrians, cyclists, and skaters on the left. Use extra caution and announce your

Figure 6. Inline Skating Skills Self-Assessment Chart

Skills	Date Achieved
Falling from a kneeling position on grass	
Falling from a standing position on grass	
Falling from a kneeling position on pavement	
Falling from a standing position on pavement	
Stationary ready position	
Ready position with movement	
Transferring weight (walking in place, laterally, forward, backward)	
A-frame stance (walking in place, laterally, forward, backward)	
V-frame stance (walking in place, laterally, forward, backward)	
Braking stance	
Finding your edges	
Rotary motion awareness	
V-walk to a coasting position	
Heel stop	
Coast to a ready position	
A-frame turn	
Striding- stroke and glide	
Sculling or swizzling	
T-stop	
Y-stop or spin stop	
Parallel turn	
Crossover turn	
Traversing hills	
Backward skating	
Backward skating C-cuts	
Forward to backward skating	
Backward to forward skating	

intentions by saying, "Passing on your left." Pass only when it is safe and when you both have enough room for the full extension position of your stroke.

- Be aware of changes in trail conditions and of hazards such as water, potholes, or storm debris. When in doubt, slow down. Do not skate on wet or oily surfaces.
- Obey all traffic regulations. When on skates, you have the same obligations as a moving vehicle.
- Stay out of areas with heavy automobile traffic.
- Always yield to pedestrians.
- Before using any trail, achieve a basic skill level, including the ability to turn, control speed, brake going down hills, and recognize and avoid skating obstacles.
- Always skate within your abilities.

Equipment and Maintenance

Inline skates are relatively low-maintenance, which is one of the appealing attributes of the sport. However, to get the highest performance and the most enjoyment out of your skates, you will need to complete a few maintenance procedures on a daily basis.

Bearing Maintenance

Bearings need to be kept clean to maintain their top performance. Bearings do wear out with use. If they get wet, it is advisable to remove both bearings and the bearing spacer from each wheel and wipe them dry. One indication of wear is a grinding noise coming from the bearing when the wheel is rolling. This noise is the result of breakdown of the grease that the bearings are packed in, or of sand, rust particles, or some other foreign material getting into the bearing casing. Buying a new set of bearings is not costly and is much easier than rebuilding an old set. Some bearings are nonserviceable.

Wheel Rotation or Replacement

Wheels wear down while skating. The wheels have a tendency to wear down on the inside of the foot. To get the maximum mileage, proper rotation is necessary. Wheel wear is influenced by many different factors, including skating surface, skaters' weight, skating style and activity, and the quality of the wheel. Rotating the wheels involves changing the wheel's position on the frame and turning the wheels over so the inside edge becomes the outside edge. Wheel rotation is the most common maintenance task you will perform on your skates. However, sometimes the wheels are so worn you must replace them altogether. A wheel needs to be rotated when it starts to look worn along the inside edges. Rotate the #1 wheel to the #3 position, the #2 wheel to the #4 position, the #3 wheel to the #1 position, and the #4 wheel to the #2 position (see Figure 7). If your skates have three or five wheels, simply rotate the most worn wheels to the wheels that show the least amount of wear. Be sure to rotate the wheels regularly to prevent them from wearing out prematurely. A severely worn wheel can be dangerous because it could cause the frame of the skate to contact the ground, resulting in a fall.

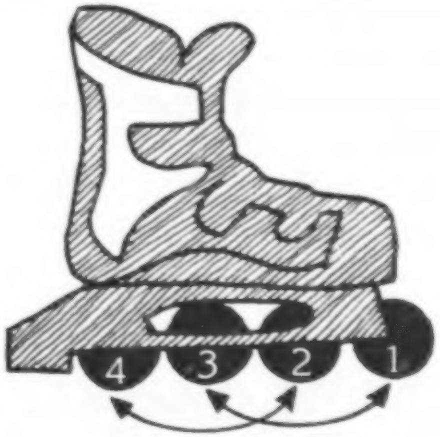
Brake Replacement

Check the wear on your brake pad before and after every use. Brake pads have a "wear line" that indicates how much life is left in the brake. Brake pads should be replaced prior to reaching the wear line indicator. The brake can be put on either skate, and a gray brake should be used for indoor use. Check to ensure that the brake pad is firmly attached.

Skates

There are many brands and types of inline skates on the market today. There are lace up skates, buckle up skates, and a combination of the two. People with a high instep should purchase lace up skates. Take the time to try on skates and skate on them for 15-20 minutes before leaving the store. Buy only skates that feel very comfortable and have quality wheels and bearings. Ankle support is one of the keys to being

Figure 7. Wheel Rotation



able to skate comfortably and safely. You should be able to wiggle your toes, and your heel should fit in the back of the skate snugly. Most importantly, you should know what you will be using the skates for, as this will determine the type of skates you should purchase.

Safety gear

Helmet
There are few helmets made specifically for inline skating. Look for one that has been approved by either Snell or ANSI.

Knee Pads and Elbow Pads
Be sure that this safety gear has a hard plastic shield over the pad and check for worn straps.

Wrist Guards
The most common injury to inline skating participants is sprained or broken wrists. The plastic brace that inserts in these guards has a tendency to slip out. Make sure this brace is always in place prior to skating. See Figure 8 for a complete safety gear check.

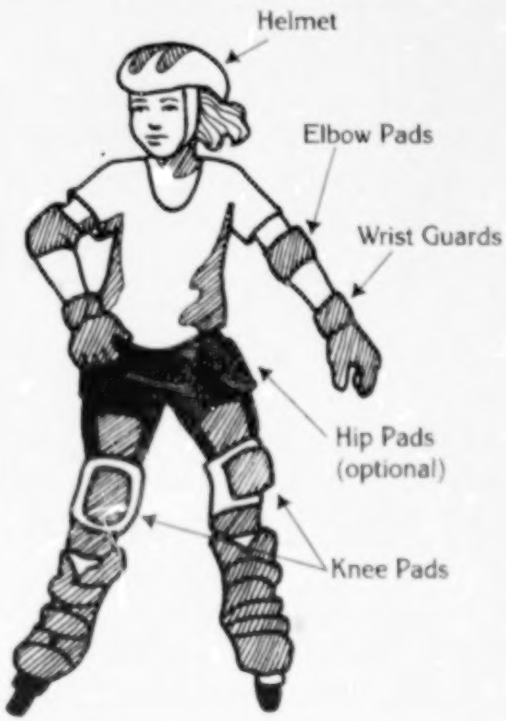
Resources for Continued Participation

Finding a great place to skate

Rollerblade has developed a list of excellent places to skate. Whether you are an advanced skater who scouts out uninhabited areas to let the wheels roll or a beginner looking for a place to get started, here are some suggestions that should help you find the perfect skating spot. However, it always smart to call ahead to make sure skating is allowed.

- Waterfront boardwalks or paved sidewalks.
- Paved bike paths.
- Industrial parks (after hours and on weekends).
- Empty parking lots.
- "Rails to trails" (old railways that have been constructed into biking/skating paths).
- High school or college tracks (if the surface and the school permit).
- Domed stadiums and arenas (be sure to call ahead to confirm).
- Community centers (many have begun offering skating and, in some cases, lessons).
- Country roads (make sure they're not too congested and are wide enough for both you and passing cars).

Figure 8. Safety Gear



Inline Skating Resources

Safety

American Society For Testing and Materials (ASTM)
100 Barr Harbor Drive
Consohocken, PA 19428-2959
T: (610) 832-9500
F: (610) 832-9555

American National Standards Institute (ANSI)
11 W 42 Street, 13th floor
New York, NY 10036
T: (212) 642-4900
F: (212) 302-1286
www.ansi.org

Bicycle Helmet Safety Institute (BHSI)
4611 Seventh Street South
Arlington, VA 22204
T: (703) 486-0100
F: (703) 486-0576
www.bhsi.org

International Inline Skating Association (IISA)
150 South 7th St.
Wilmington, NC 28401
T: (910) 762-7004
F: (910) 762-9477
www.iisa.org

U.S. Consumer Product Safety Commission (CPSC)
Washington, DC 20207
T: (301) 504-0424
F: (301) 504-0124
Info@cpsc.gov

National Safe Kids Campaign
1301 Pennsylvania Avenue NW
Suite 1000
Washington, DC 20004-1707
T: (202) 662-0600
F: (202) 393-2072
www.safekids.org

Protective Headgear Manufactures' Association (PHMA)
15750 Concord Circle
Morgan Hill, CA 95037
T: (408) 779-6229 x 2327
F: (408) 776-7733

Rollerblade, Inc.
One Sportsystem Plaza
Bordentown, NJ 08505
T: (800) 283-6647
www.rollerblade.com

Skate in School
P. O. Box 24185
Edina, MN 55424
T: (888) 758-4386
www.skateinschool.com

Snell Memorial Foundation, Inc.
3628 Madison Avenue
Suite 11
North Highlands, CA 95660
T: (916) 331-5073
F: (916) 331-0359
snellit@aol.com
www.dk.com

Sports Leagues and Associations

Aggressive Skaters Association
171 Pier Avenue
Suite 247
Santa Monica, CA 90405
T: (310) 399-3436
F: (310) 581-3552
asa@aggroskate.com

National Inline Basketball League
135 Rivington Street, #3F
New York, NY 10002
T: (212) 539-1132
F: (212) 539-1133
www.nibbl.com

National Roller Hockey LLC (NARCH)
3830 Broadway, Suite 35
Boulder, CO 80304
T: (303) 786-8764
F: (303) 546-0581
kdluff@aol.com

Roller Hockey International–Amateur
249 East Ocean Boulevard, Suite 8000
Long Beach, CA 90802
T: (562) 628-0590
F: (562) 628-0524

USA Hockey Inline
4965 North 30th Street
Colorado Springs, CO 80919
T: (719) 599-5500
F: (719) 599-5994
usah@usahockey.com

USA Inline Racing
P.O. Box 162055
Altamonte Springs, FL 32716-2055
T: (407) 682-2328
F: (407) 682-2388
www.usainline.org

USA Rollerskating
4730 South St.
Lincoln, NE 68506
T: (402) 483-7551
www.usars.com

Books

Baum, Stephen. (1997). *How to Inline Skating Flipbook Series*, 24 pp. Spiral-bound pocket-sized references illustrate technique for all skating levels.

Heeley, Mark. (1996). *1st Inline*, 128 pp. Full color large format book with excellent illustrations of equipment, technique, and maintenance.

Millar, Cam, and Curtis, Bruce. (1996). *Inline Skating Basics*, 96 pp. Plenty of step-by-step instructional color photographs geared toward the recreational skater.

Miller, Liz. *Get Rolling*. Expanded edition of one of the first inline how-to books. Now with photographs.

Nottingham, Suzanne, and Fedel, Fred. (1997). *Fitness Inline Skating*, 176 pp. Includes 48 different workouts grouped across six different training zones of increasing difficulty.

Powell, Mark, and Svensson, John. (1993). *Inline Skating*, 127 pp. Black and white photographs, drawings, and text that introduce the reader to all facets of inline skating.

References

Bunting, C. (2002). *Inline Skating*. In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education*. Reston, VA: National Association for Sport and Physical Education.

Dugard, M. (1996). *Inline Skating Made Easy*. Guilford, CT: The Globe Pequot Press.

International Inline Skating Association (IISA), 150 South 7th St., Wilmington, NC 28401, *www.iisa.org*

Mathis, K. et al. (1995). Instructor Certification Manual; International Inline Skating Association.

Powell, M., and Svensson, J. (1998). *Inline Skating*. Champaign, IL: Human Kinetics.

Rappelfeld, J. (1992). *The Complete Inline Skater*. New York, NY: St. Martin's Press.

Rollerblade, Inc., One Sportsystem Plaza, Bordentown, NJ 08505, (800) 283-6647, *www.rollerblade.com*

Seefeldt, V. (Ed.) (1986). *Physical Activity and Well-Being*. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD).

CHAPTER 14

Lacrosse

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NASPE wishes to thank US Lacrosse and STX Lacrosse for their contributions to this chapter. Additional information regarding this sport is available at www.lacrosse.org and www.stxlacrosse.com.

Introduction

The exact origin of lacrosse is not known. Most historians believe that the game was developed by the Native Americans more than 1,000 years ago in the southeastern part of the United States. From reports given by travelers in the 17th, 18th, and 19th centuries, lacrosse was played extensively in all parts of Canada and the United States except in the southwest. From all accounts, lacrosse is one of the oldest American sports currently in existence; one of the few major sports that is American in origin.

In its earlier form (called "baggataway") it was a regular feature of Indian life, having definite religious significance. It was played for enjoyment and satisfaction of both the participants and spectators because of the ritual surrounding it. Some historians believe that the game's primary purpose and popularity was in training for war, because it contained many of the components considered necessary for Indian warfare (e.g., courage, ruggedness, skill, speed, and endurance). The game had many names, with "game of ball" or "ball game" being the most commonly used by traditional Indians. Non-Indians often referred to the game as "Indian stickball" (Oxendine, 1998, p. 36). On the North American continent, lacrosse was an immensely popular game. Canada established it as its national sport in 1859 (Oxendine, 1988), and it continues to be so today.

Today, lacrosse is a significant sport in the schools, colleges, and universities in the United States. Although a similar lacrosse game is played by both women and men, there are several differences: the men's game is a contact sport whereas the women's game is a noncontact sport; the men's game has fixed boundaries with goals 80 yards apart whereas the women's game has natural boundaries with the goals 100 yards apart; the men's game has an off-side rule whereas the women's games does not; the men play with 10 players whereas the women play with 12; and the women's stick has a shallow pocket whereas the men's stick has a deep one. Players in both games must be in excellent condition because both games are very fast and rely on quick passing and catching to move the ball down the field and in position for a shot at the goal.

STXBall-Lacrosse was developed as a no-contact form to lead up to lacrosse. It uses skills and strategies similar to the parent game while eliminating the rough play and complex strategies that are inappropriate for beginning players. Additionally, the STXBall stick uses a removable "keeper-strap" to help keep the ball in the basket when a player is learning to catch. The straps can be removed as players' skill levels increase and the players are ready for a greater challenge.

Terminology

Attack. The players on the offensive team.

Body Marking. Placing one's body between an opponent and the goal the opponent is attacking so as to impede progress and force the attacker to pass or to take an indirect path toward the goal.

Cradle. The rhythmical movement of the stick that is used to keep the ball in the crosse and is designed to be part of the natural running movement.

Crease. The circle around the goal cage which no

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player may break the plane of, whether it is while shooting, picking up a ground ball, or running through. This applies to all players except the goalkeeper or the person deputizing for the goalkeeper.

Crosse. The term used for the lacrosse stick itself.

Cutting. The act of moving into a space in hopes of receiving a pass from a teammate.

Defense. The team that does not have possession of the ball.

Give and Go. When a player passes to a teammate and then cuts and receives a pass back.

Marking. Being within a stick's length of a player from the other team.

Offense. The team in possession of the ball.

Quick Stick. A shot where the attack player receives the pass and takes the shot in one motion without cradling.

Stand. All players must remain stationary following the sound of a whistle.

Throat. Portion of the stick where the handle and the head join.

Strong Side. The side of the field that the ball is on.

Weak Side. The side of the field that the ball is not on.

Fitness Requirements

Due to its fast-paced nature, lacrosse requires an athlete to have stamina, speed, flexibility, strength, agility, and cardiovascular conditioning. The cardiovascular training should include both aerobic and anaerobic conditioning.

Prior to and after any lacrosse workout, players should focus on flexibility and include a good stretching regime. The goal of stretching should be to increase the range of motion in a particular joint. Stretching should be done in a slow, relaxed manner and should be held for a minimum of 10 seconds without bouncing. Due to the nature of the sport, lacrosse stretches should include both upper and lower body exercises. Exercises for the lower body should include the hamstrings, quadriceps, hips, lower back, groin, calf, and ankle. Upper body exercises should include the shoulders, neck, biceps, triceps, and abdominals. The athletes should remember to breath normally while stretching and stretch only to the point where they feel tightness.

Strength training ideally should take place year-round. It is best to strength train outside of scheduled practice time because of the time required for all the other skills. These sessions should include training for both muscular endurance and muscular strength. To increase muscular endurance, lighter resistance is used with more repetitions. Muscular strength is improved with fewer repetitions and heavier weight. Any weight-training program should be monitored so the amount of resistance is progressively increased.

Agility training should be a big part of any lacrosse training. This will help the athlete be able to change directions quickly, increase reaction time, have better body control, and make quick movements on the field. This training should be performed for short intervals with maximum speed and quickness. Movement patterns should take place in all directions. Examples include skipping and starting and stopping on a whistle.

Plyometric exercises are also a great way to train for the vigorous sport of lacrosse. Plyometrics are training for explosive power. These can include speed jumping over cones or boxes and bounding exercises.

Cardiovascular conditioning should include distance running, interval running, and sprints. Running is key to the sport of lacrosse, and a team is more likely to be successful if they are well-conditioned. High school athletes should be able to run a minimum of two miles and have a base level of conditioning when they begin their season.

Skills

The basic skills necessary to be successful in lacrosse include cradling, catching, throwing, pick ups, cutting, dodging, and shooting.

The Grip

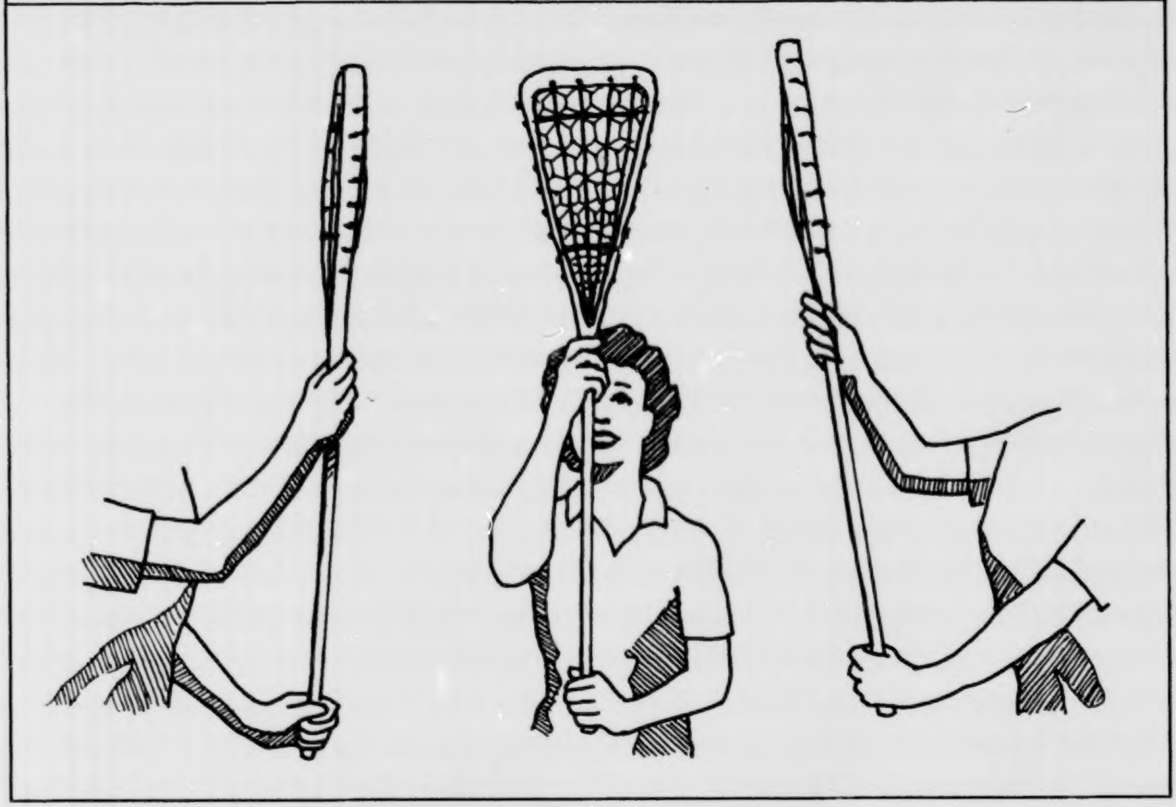
Either hand can be uppermost on the stick, but usually the dominant hand is placed at or near the top of the stick. The top hand is positioned by having the pocket of the crosse facing the player and placing the V formed by the index finger and thumb in line with the V formed by the stick. The grip should be firm, and the fingers should wrap around the throat of the stick. To learn the correct grip, place the stick on the ground with the open part facing up and then bend down and pick up the crosse with the dominant hand at the throat of the stick.

The bottom hand should be placed at the butt end of the stick. The elbow should be bent, and the stick should be kept at waist level.

Points to Remember:

- The higher the top hand, the better control you have on the stick.

Figure 1. The Grip



- Keep a comfortable hold on the stick and do not allow it to turn in your hands.

The Cradle

Cradling is the semicircular movement of the stick used to keep the ball in the crosse. It is the basis of all stickwork and allows the player to keep possession of the ball. The cradle should be timed to fit in with the running action of the player. The following steps should be practiced to achieve an effective cradle:

1. With the stick head facing you, form a V at the throat of the stick with your dominant hand. With the other hand, hold the stick waist high.
2. The top hand should swing the stick vertically across the body from ear to ear. The wrist of the top hand should rotate inwardly. Keep the stick high.
3. The bottom hand bends across the body and is moved from hip to hip. The bottom hand motion is similar to opening and closing a gate. The forearm of the bottom arm should stay parallel to the ground. The bottom hand should provide the power while the top hand guides the stick.
4. Keep the top elbow close to the side of the body. Do not allow it to drop behind the body.
5. Use your wrists.
6. Relax your arms.
7. Both arms must work together.

Points to Remember:

- Keep the stick vertical.
- Look where you are going and not at the ball.
- As the speed of the run increases, the movement of the arms and wrists become a little quicker and smaller.
- The bottom hand takes a bigger arc than the top hand.

Practice Techniques:

1. Cradle while looking in a mirror to see what the arms are doing.

2. Start cradling with your back against a wall. This forces the bottom hand to do the work and allows the bottom elbow to stay in front of the body.
3. Cradle with each hand individually. Use only the top hand, emphasizing the ear-to-ear motion. When using only the bottom hand, concentrate on a full cradle across the body.
4. Sit on the floor and cradle.
5. Cradle while moving first without the ball; when you're comfortable with this, add the ball to the cradling motion. Start with walking, then jogging, and work toward running full speed.
6. Cradle to music.
7. Practice cradling with both the dominant and nondominant hands at the top of the stick.
8. As your skill level increases, work on cradling at different heights.

Ground Ball Pick Ups

Controlling ground ball pick ups is essential to the game of lacrosse. Typically the ball will be moving, but it is easier to first learn how to pick up a stationary ball. All pick ups should be done in the most efficient way possible. The key to all pick ups is to get low to the ground and run through the ball.

Stationary Pick Up

1. Approach the ball with the same foot forward as the top hand on the stick. The foot should be placed to the side of the ball facing forward.
2. The head should be directly over the ball.
3. Eyes should be kept on the ball.
4. Bend from the knees and the waist to bring the stick as close to the ground as possible.
5. The stick should be on the bottom hand side positioned behind the ball and almost flat on the ground.

Figure 2. The Cradle

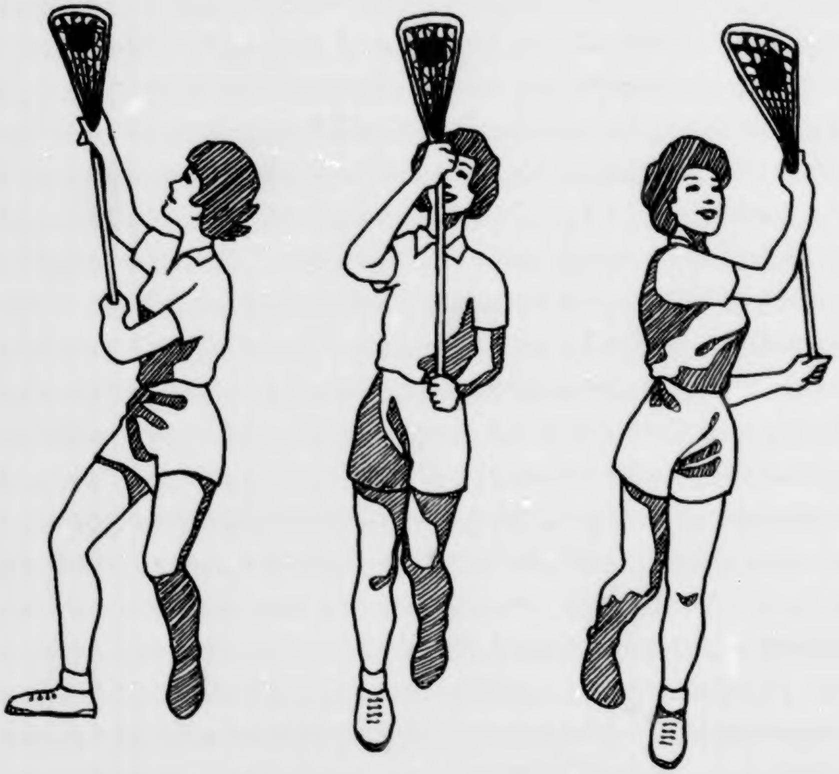
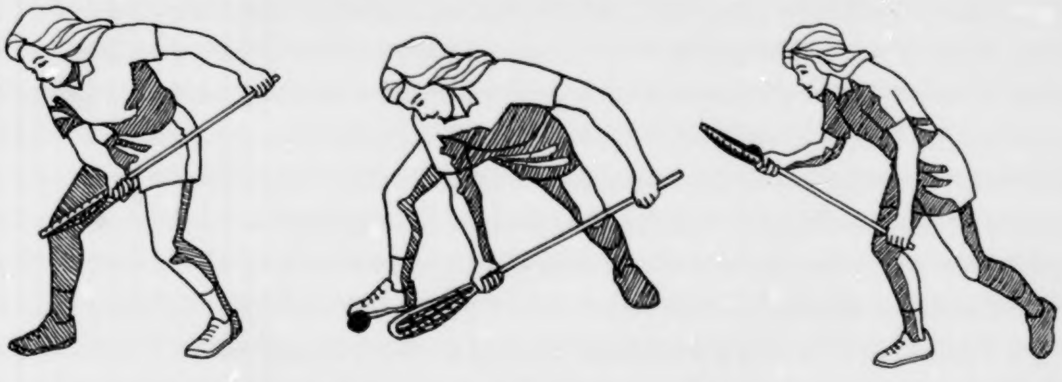
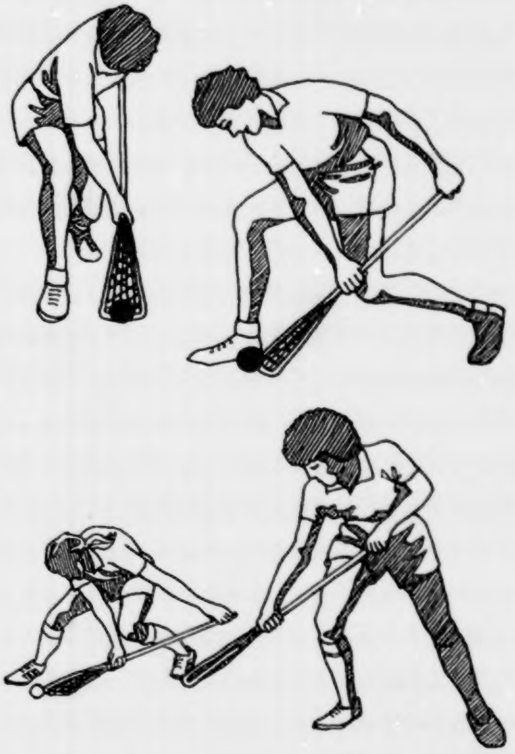


Figure 3A. The Pickup–Stationary Ball



6. The stick should be pushed through the ball, while moving to meet the ball, with a strong bottom arm.
7. Remain low as the ball moves into the crosse so it doesn't flip out.

Figure 3B. The Pickup–Ball Rolling Away from Player



8. The cradle should begin as soon as the ball is in the stick and should be brought to a vertical position immediately.

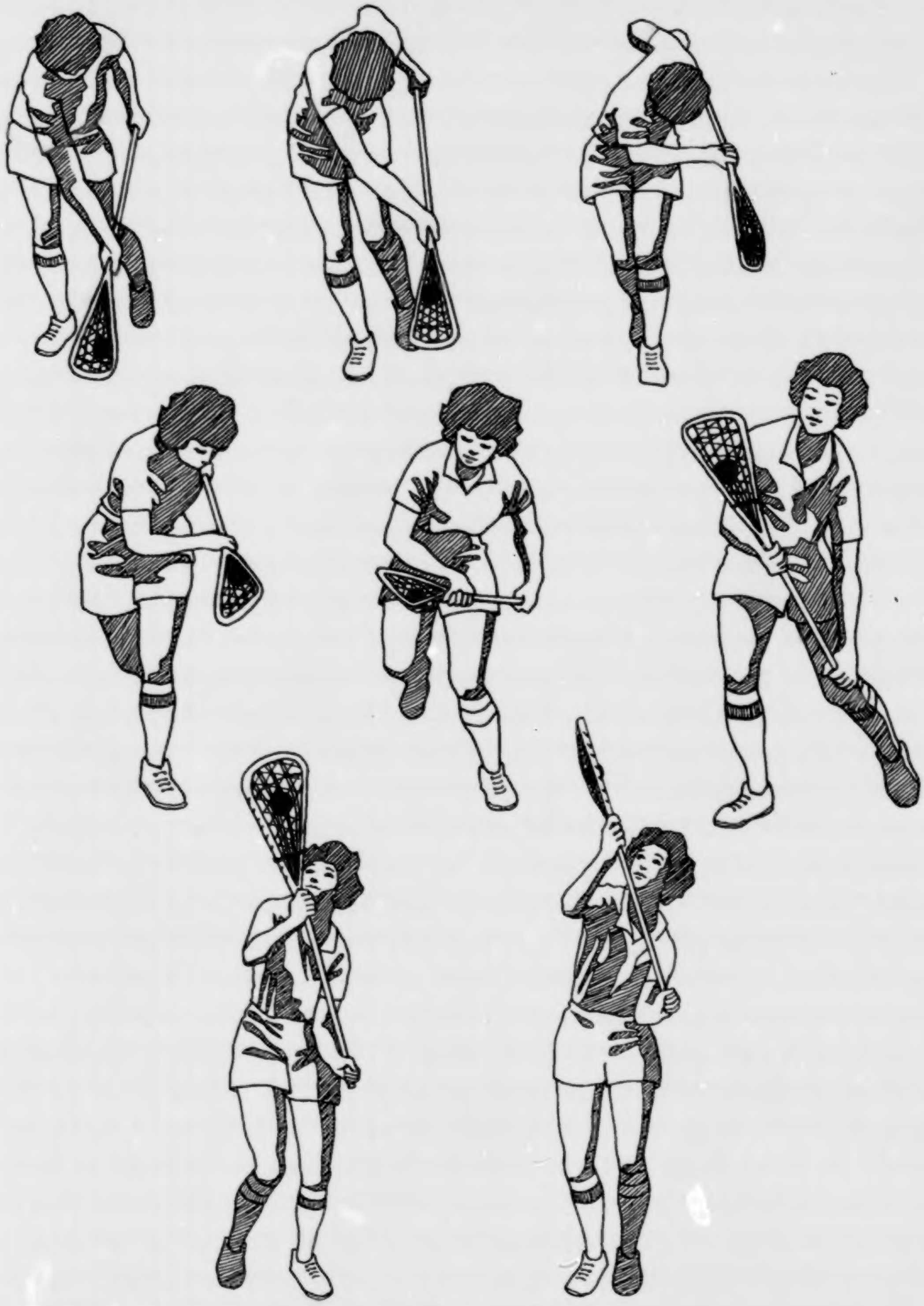
Pick Ups Going Away
The motion for the ball rolling away is the same, but the challenge is to gauge the speed of the ball. The player must catch up to the ball and be moving faster than the ball. The body must still bend and be low to the ground. The speed of the stick moving under the ball should be increased to assure success. The cradle should begin immediately. If the ball is going too fast, the stick should be angled across the path of the ball.

Pick Ups Coming Toward the Player
The stick mechanics in executing a pick up when the ball is coming toward a person is different than the previously described actions. The player should get in line with the ball and go to meet it. The stick should be at a 45-degree angle (almost vertical) to the ground with the stick head touching the ground. The hips should turn in order to allow the stick to be close to the side of the body. As the ball enters the stick, the player must give back to slow the ball. Cradling should be immediate as the player increases speed when moving through the ball.

Points to Remember:

- When picking up the ball, hold the stick to the side of the body. An uneven playing surface can result in an injury if the stick is in front of the body.
- Get low to the ground and push through with the bottom hand.

Figure 3C. The Pickup–Ball Rolling Towards Player



- Keep your eyes on the ball and your head over the ball.
- Move to meet the ball and run through your pick up.
- Give with the ball and angle the stick for a pick up coming toward you. The faster the roll of the ball, the greater the angle of the stick with the ground.
- Let the ball roll into the stick.
- Begin to cradle immediately.

Practice Techniques:

1. Start kneeling down with the ball to the side. Practice driving the stick through the ball and cradling immediately. Use your bottom hand only to pick up the stationary ball.

Figure 3D. The Pickup–Ball Rolling Towards Player Variation

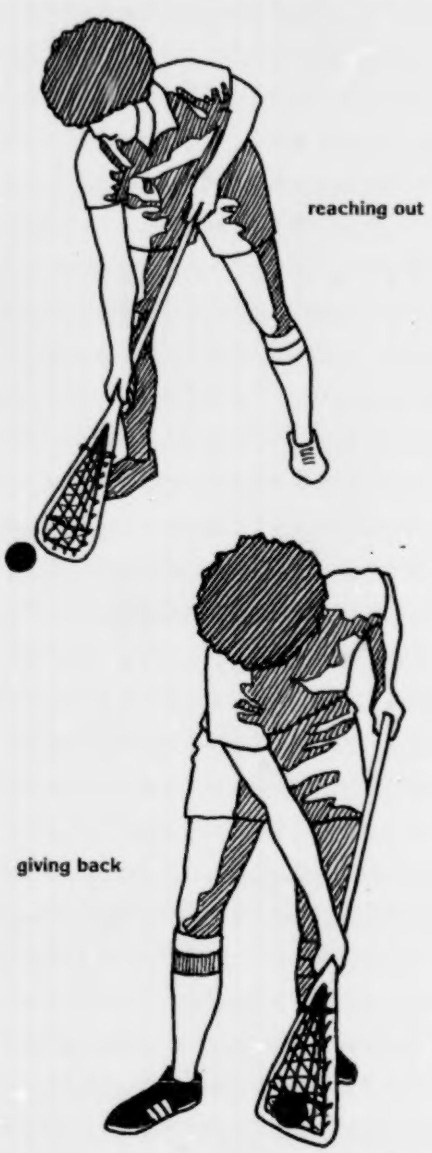
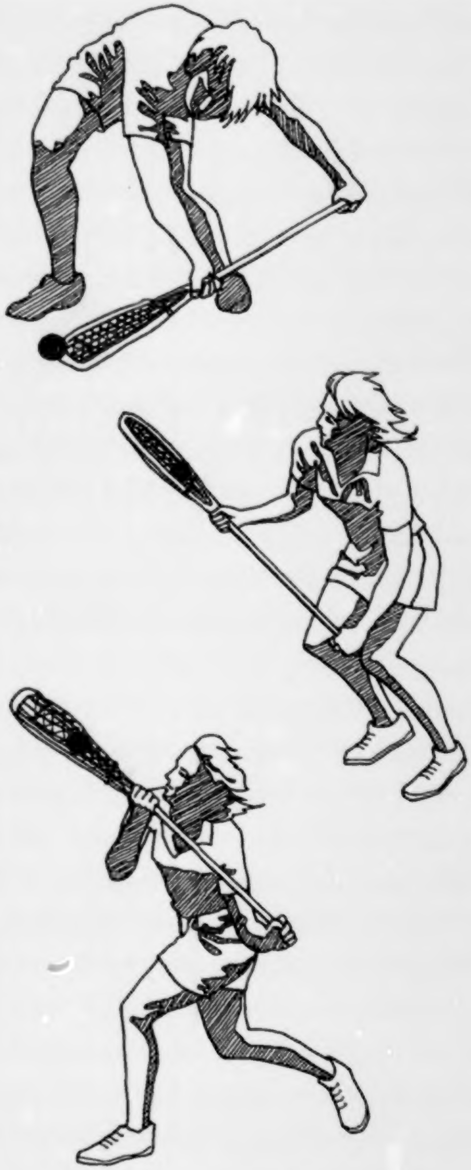


Figure 3E. The Pickup–Getting Stick Low through First Cradle

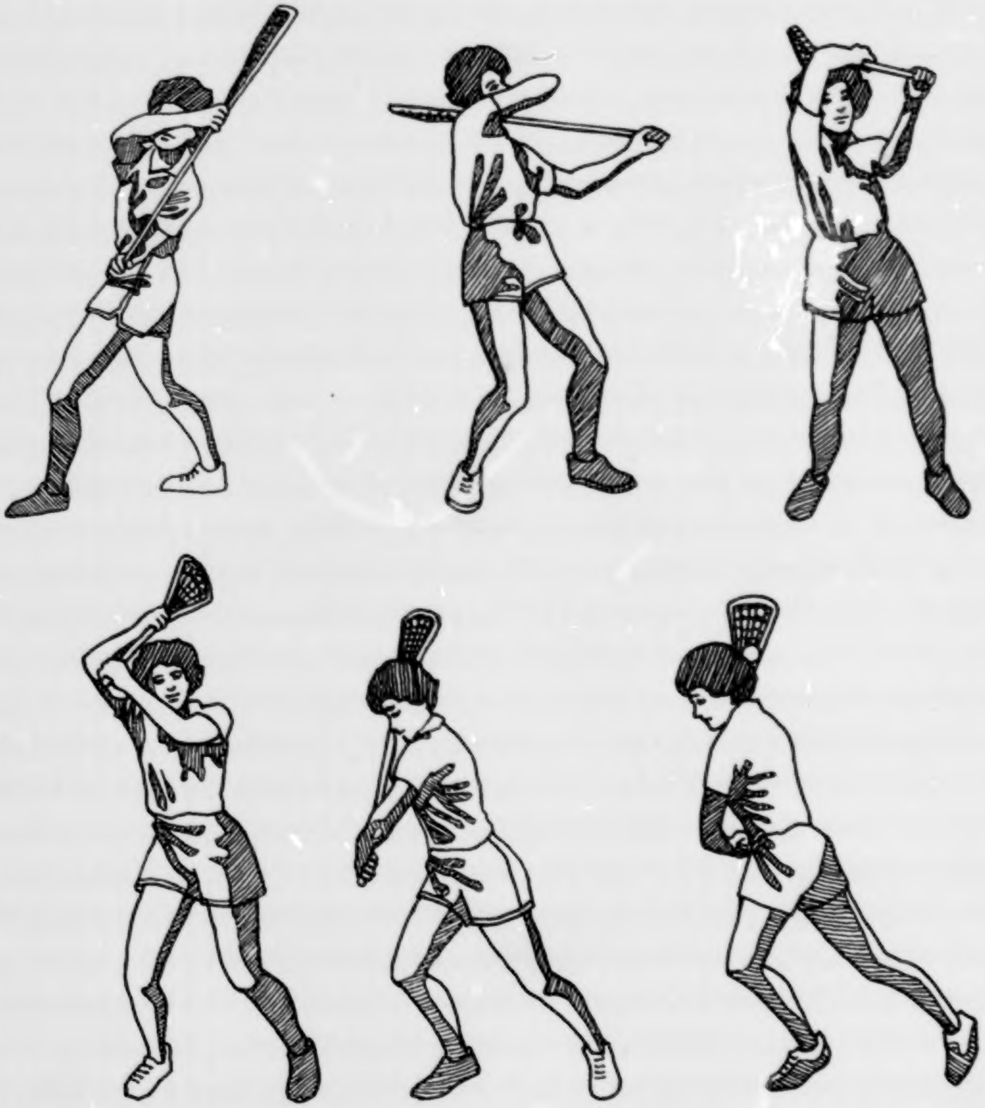


2. With the ball five yards away, each player runs forward, picks up the stationary ball, cradles it, and replaces the ball for his or her next turn.
3. In twos, one player rolls the ball for the player attempting the pick up. This should be done going both toward and away from the player.
4. In fours, three players have a ball and use their sticks to form a bridge over the ball. The fourth player must get low to the ground and go under the other players' sticks to pick up the balls consecutively.

Pivot

The pivot allows a player to change directions quickly without running around in a circle while in possession of the ball. It is very similar to the pivot learned in basketball. The player should emphasize the following techniques when executing a pivot:

Figure 4. The Pivot



- Both feet stay on the ground as the forward foot is planted. The stick should be on the same side of the body as the front foot.
- The weight should be over the front foot as you push off, turn, and shift the weight to the rear foot.
- The stick should stay close to the body and remain vertical as the pivot is made.
- Turn toward the back foot.
- Protect the ball while turning.

Points to Remember:

- The stick is brought over the head in a cradling action as the pivot is executed. Both arms swing over the head together.
- A strong pull of the bottom hand at waist level is important.
- Do not pause in your movement as you turn. Make it continuous.

Practice Techniques:

1. Practice the footwork by itself.
2. In lines, cradle and pivot on the whistle.
3. Combine with rolling the ball out, picking up, and then pivoting.

Catching

Catching and throwing are essential parts of the game of lacrosse. The player should present a target with the open part of the crosse toward the passer. It is important to watch the ball and give with it as the ball comes into the stick. The arms should be relaxed, and the stick should wrap around the ball and begin the cradling motion after the ball is caught. The player should be moving to meet the ball for the catch.

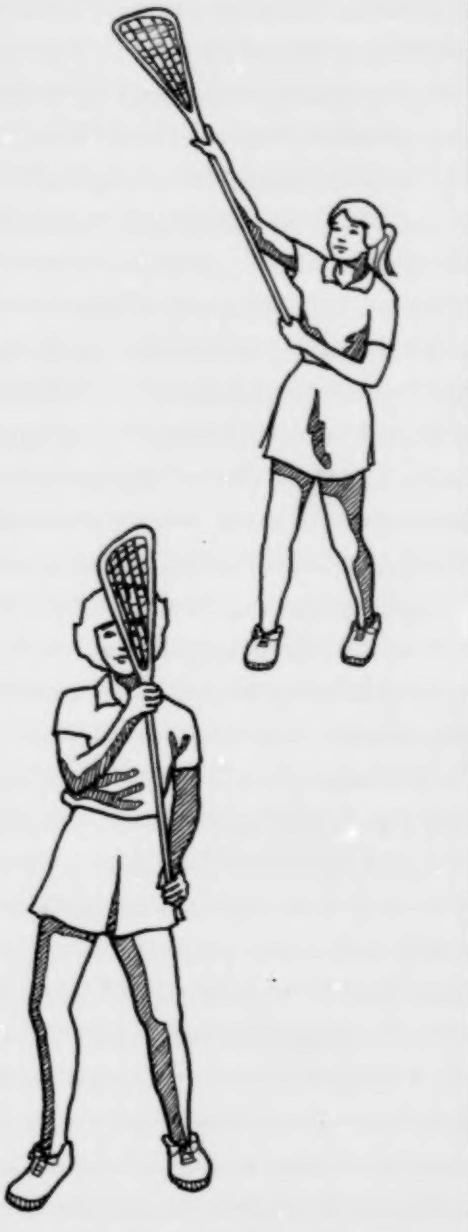
Points to Remember:

- Play the ball out in front of the body.
- Catch the ball in the widest part of the stick.
- Angle the head of the stick toward the ball so the ball can roll down the face of the stick when caught.
- Keep the V of the top hand in the front of the stick. Do not shift the grip.
- Think of the stick as an extension of the arm.
- Watch the ball into the stick.
- Give with the ball.
- Begin the cradle immediately with both hands.

Practice Techniques:

1. Work individually against a wall.
2. Toss the ball and catch with your top hand only. Progress to tossing to yourself with both hands on the stick.
3. Pass and catch with a partner.

Figure 5. The Catch



4. Use a shuttle formation moving to meet the ball.
   xxxx. ———————— xxxx

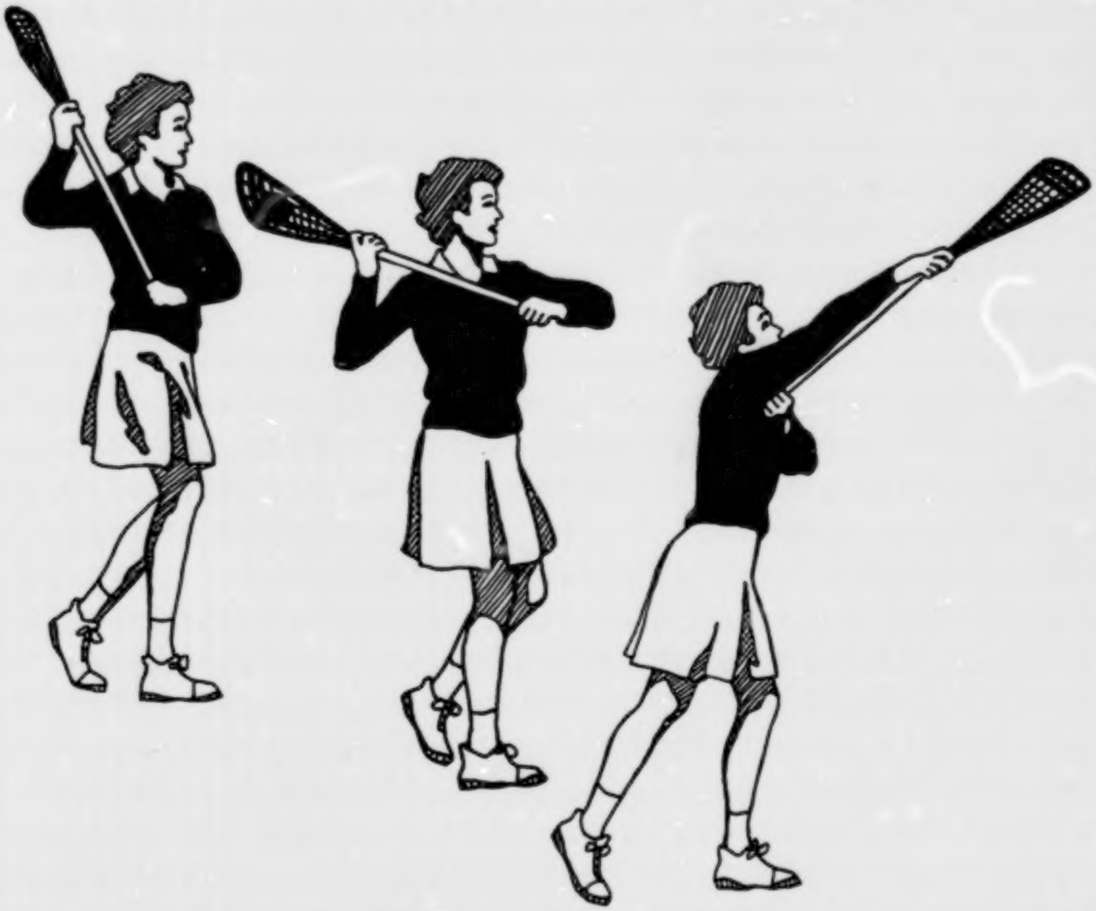
Passing

The overarm throw is the most basic pass and shot. It is a fundamental skill that is key to the game. The passer should have a continuous movement from the cradle to the throw. To begin the passing motion, the player cradles to the side of the top arm (right if the right hand is on top). The bottom hand comes across the body as the top shoulder is taken back. As the stick is brought back, the V of the top hand slides behind the stick in preparation for the throw. The top arm elbow is bent, and the bottom hand is pointing toward the intended target. The overarm throw is a lever-type motion with the bottom arm providing the power in the push and pull motion. The follow-through is in the direction of the throw. The stick becomes an extension of the arm and is fully extended. The player steps into the throw with the opposite foot and transfers his or her weight.

Points to Remember:

- It is the same motion as throwing a softball.
- Rotate the shoulders and have a good high stick position.
- Change your grip on the stick.
- The top arm directs the ball, and a good wrist snap assures pace and accuracy.
- Have the butt end of the stick pointing in the direction of the throw.
- Follow through where you want the ball to go. The height of the stick on the follow-through determines the height of the pass.
- The bottom arm finishes under the armpit.

Figure 6. The Overarm Throw



Practice Techniques:

1. In twos, pass back and forth.
2. Use a shuttle formation as described under catching.
3. In twos, run down the field passing and catching about 20 yards apart. Throw a leading pass so the receiver can continue to run at top speed.

Cutting

Cutting involves the ability to get free. It is primarily used to receive the ball. Cutting is also used to create space for a teammate or to reposition to a more effective spot. It can be used to pull defenders away from the goal cage.

Points to Remember:

- Timing of cuts is key to their success. Don't go too soon or use space until a teammate is in position to pass the ball.
- Come and meet the ball and present a target. Ask for the ball away from the defender.
- Make a direct pass ahead of the cutter so the cutter can maintain speed.
- Make a preliminary move in a different direction than where you want to receive the ball.
- Some players should be cutting to the ball and others should be cutting away to create space.

Dodging

Dodging is the technique used to move around a defender who is in the ball carrier's path. Typically the intent is to draw an opponent one direction in order to get around him or her. In executing a dodge, the player will have a sudden change in movement of the stick and/or the body, along with a change is speed. The intent is to get the opponent off balance so the player can move around the defender. The player should fake the opponent to the opposite side of the intended dodge and protect the ball throughout the motion.

Points to Remember:

- The dodger attempts to force the body checker to commit to one side.
- Accelerate at the moment of the dodge.
- Never leave the crosse to the side or behind the body.
- Keep a strong cradling action.
- Vary the rhythm and level of the cradle.
- Your footwork should be well balanced, and you should not make wide, sweeping runs.
- Go directly toward the opponent to dodge. Try to get as close to your opponent as possible.
- Be deceptive. A quick fake to one side before going to the other is often effective.

Practice Techniques:

1. Practice moving (walking, then running) toward a stationary opponent and then dodging past the opponent. Pull the crosse to the side away from the opponent. Have the defender become more active.
2. Two players run toward each other, each with a ball, and dodge the other player. Each player must dodge to the same side. Make sure players only step one step off the straight line.
3. In threes, two players stand facing each other with their sticks up and almost touching. The third player runs through, keeping the cradle action going even when hitting the other sticks.
4. One player faces four others and, with a ball, dodges past the first on the left, the second on the right, the third on the left, and the fourth on the right. Rotate players and repeat the process.

Body Marking or Body Checking

Body marking involves placing one's body between an opponent and the goal in order to force the opponent to change his or her desired path to the goal. It involves no body contact between the two players. Footwork is key to successful body marking. The defender should have the weight distributed evenly on the balls of the feet and be moving prior to the opponent's arrival. The defender should stay ball side and goal side and shadow the opponent's movement. The stick should be up, and the defender should create as much of a barrier as possible.

Points to Remember:

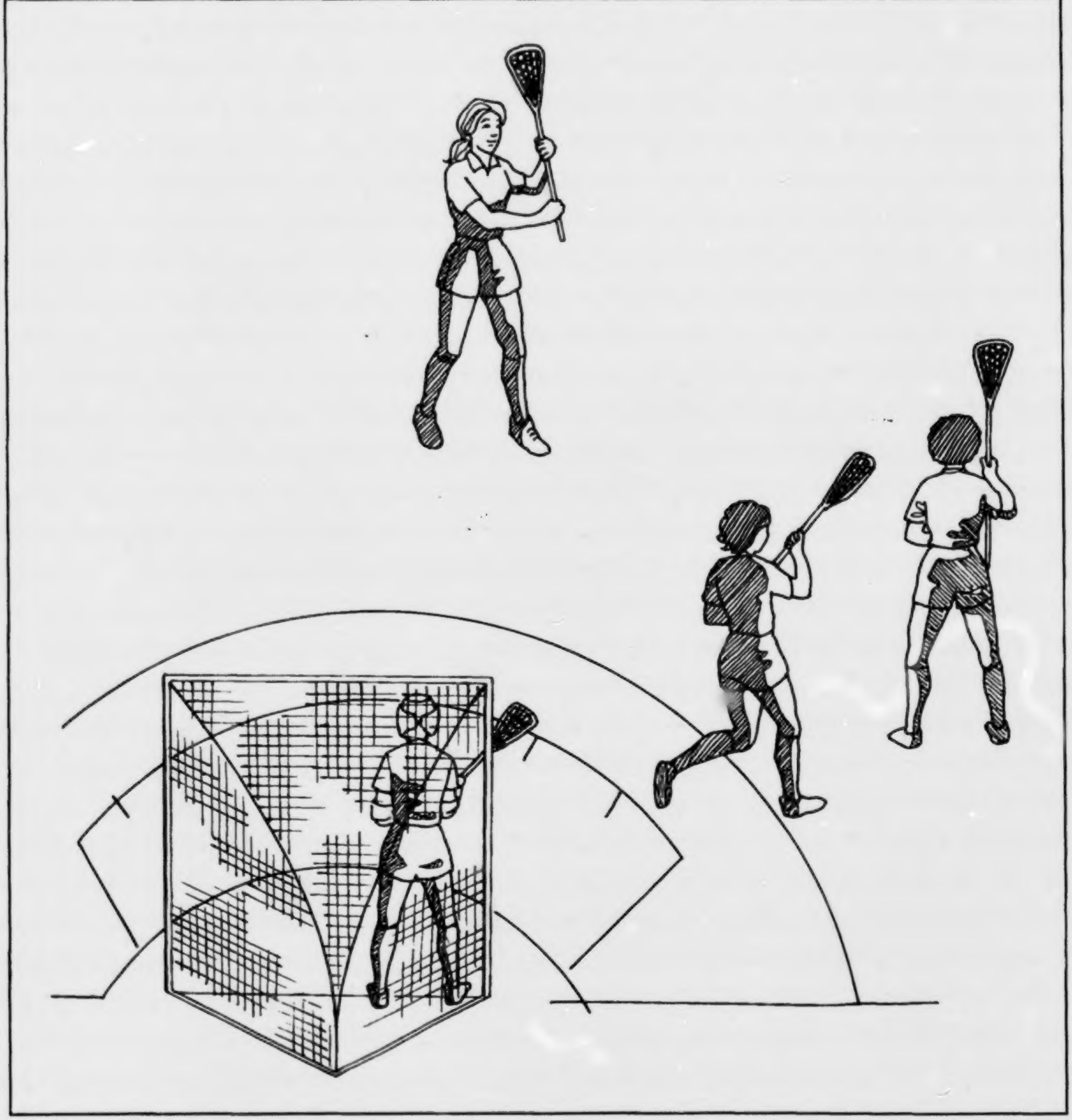
- Anticipate the ball carrier's movement.
- Have your feet facing the same direction as the ball carrier and position yourself hip to hip with that player.
- Keep the stick up and shadow the opponent's stick.
- Try to force the ball carrier to his or her weak side or to the outside of the field.

- Keep your feet moving by using quick, small steps.
- Meet your opponent with enough room to move backwards before the onrushing player gets to that spot.

Practice Techniques:

1. Partners face each other with their hands on each other's shoulders. The defense player twists his or her feet so they are going in the same direction that the attack player is running. When the attack changes direction, the defender must pivot his or her hips quickly so the feet are going in the same direction as the attacker.
2. Practice running diagonally backwards to the right and left.
3. Face a leader and mirror the leader running forward, backward, right, and left.

Figure 7. Defensive Positioning



4. Two players face each other 10 yards apart. One player runs at the opponent and attempts to run past him or her. Try this with and without sticks.

Shooting

In order to win the game of lacrosse, you must score goals. There are many different kinds of shots, and every attack player develops a unique style. Changing speed, ball placement, height, and trajectory can vary shots and increase the likelihood of success.

Points to Remember:

- The main thing to remember is to shoot where the goalkeeper is not and to vary your shots.
- Aim for the corners.
- Never allow your crosse to follow through and break the plane of the goal circle.
- Transfer your weight and follow through.

Safety Concerns

As with any sport, there is a risk involved in playing lacrosse. The sport involves moving players, a moving ball, and an implement in each player's hands. Learning proper skill techniques will assure a positive experience throughout one's lacrosse career.

A proper and gradual warm-up is essential prior to beginning any activity. Players should stretch all body parts and run before beginning. Warm-ups should include training for flexibility, strength, agility, and cardiovascular endurance. Proper attire should be worn, and players should make sure they have appropriate footwear.

The following safety rules should be strictly followed:

- When not playing, hold your stick either
  a. at the throat with your top hand and with the top of the stick pointing down (this will bring the stick in line with the body/parallel to it) OR
  b. with two hands in the "waiting position" (arms relaxed, hands in "correct grip").
- Do not swing or twirl your stick.
- When playing, use two hands on the stick at all times unless you are told to use one hand.
- When playing with someone or against someone, you may not touch his/her person **at any time.**
- When the ball gets away from you, walk to where it is without touching anybody else and pick it up with your hand (until you learn how to pick it up with the stick).

Competition

STXBall/Lacrosse games are recommended for beginner play because they allow for greater initial success and safety, they allow higher levels of individual activity, and they can be played indoors or out.

Create three or four fields by putting two hockey goals opposite one another across the width of the field. Use small cones, floor tape, or turf paint to create a crease around the goals (see Figure 8).

Divide into teams of four or five and play according to the following basic rules:

1. Play begins with a coin toss. One team starts with possession.
2. There must be at least three completed passes before a shot can be attempted on goal.
3. Each gender must touch the ball before a shot can be attempted on goal.
4. If stalling occurs, a possession time limit can be implemented. A player may only possess and travel with the ball for four seconds. The defenders must count the four seconds.
5. Both hands must remain on the stick.
6. No one is allowed in the crease area.
7. There are no goalies or goalkeepers. All players should be moving.
8. **There is no person or stick contact.**
9. Possession changes after each goal.

Penalties for violations can range from change of possession to penalty shot, to penalty box, to expulsion from the game, depending on the severity of the violation and the number of previous offenses attributed to the offending player.

Tactics

Team tactics should be the emphasis after players have mastered the basic skills of lacrosse. Because lacrosse is fast paced, transition is important in team offense and team defense.

Spacing is essential to success in lacrosse. Players should be aware of their positioning in relation to their teammates and the ball. They must also be aware of where their opponents are and their position relative to the goal cage. Players should adjust their position in order to complement their teammates.

Timing is key as players become aware of other people and begin to react to them. Good timing is important in cutting, passing, intercepting, and shooting. Players should focus on changing speed and/or direction to become better at timing.

Team offense should be the focal point whenever an individual or team is in possession of the ball. The general principle of offense is to attempt to create numerical superiority on the offensive end of the playing field. Attack players should always be moving either to create a space or to receive the ball. It is faster to get the ball down the field in transition by passing than by running. The players nearest the ball should cut toward the ball while others further away cut away to make space. An attack player should always be nearer to the goal than the player with the ball. The more the offense passes the ball, the more the defense needs to adjust their positions. **Moving** the ball from one side of the field to the other makes it harder for the defense to reposition.

Team defense begins as soon as your team loses possession of the ball. Every player on the team must know how to play defense. The aim is to gain possession of the ball as quickly as possible, not allowing the other team a scoring opportunity. Good defense results in blocked passes, interceptions, or forcing the attack to make a poor pass. Defensive players must mark their opponents about a stick's distance away on the ball side. They also must remain between their opponent and the goal cage that their team is defending. Defensive players should extend their sticks into the passing lane and take up as much space as they can defensively. If an attack player does receive the ball, the defender should try to slow the attacker down and away from a direct path to the goal. The key to team defense is constant communication between team members.

Primary Differences Between Women's and Men's Lacrosse Games

WOMEN'S LACROSSE GAME	MEN'S LACROSSE GAME
Noncontact sport	Limited contact sport
Visual Guidelines	Fixed sidelines
Goals 100 yards apart	Goals 80 yards apart
12 players per side	10 players per side
Stick has shallow pocket	Stick has deep pocket

Resources

American Sport Education Program. (1997). *Coaching youth lacrosse.* Champaign, IL: Human Kinetics. www.asep.com

Green, T. S. & Kurtz, A. B. (1989). *Modern women's lacrosse.* Hanover, NH: ABK Publications.

Hutcherson, K. (2002). *Lacrosse.* In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education.* Reston, VA: National Association for Sport and Physical Education.

Oxendine, J. B. (1998). *American Indian sports heritage.* Champaign, IL: Human Kinetics.

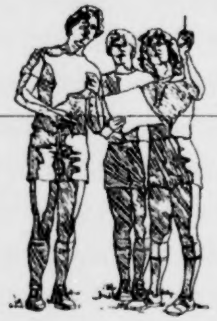
US Lacrosse
113 W. University Parkway
Baltimore, MD 21210-3300
410.235.6882
410.366.6735 fax
www.lacrosse.org

STX Lacrosse
1500 Bush Street
Baltimore, MD 21230
800-368-2250
www.stxlacrosse.com

Detailed lesson plans for including Lacrosse in Physical Education programs are available from US Lacrosse, www.lacrosse.org.

CHAPTER 15

Orienteering



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Introduction

Discovery of the Compass

Around 2500 B.C., the Chinese discovered that if they placed a lodestone on a piece of wood and floated it in the water, the wood and the lodestone would always turn in the same direction. The Greeks may have also discovered this phenomenon. Although the Arabs and the Vikings used a primitive form of the compass, its use wasn't documented in written form until a medieval monk by the name of Alexander Nerckam wrote about it in the 13th century. The modern protractor compass wasn't developed until the 1930s.

History of Orienteering

Orienteering, the competitive sport, began in Scandinavia in the late 1800s as a means of training the military. However, it wasn't until 1919 that modern orienteering began. Major Ernst Killander, considered the father of orienteering, used orienteering as a means of keeping the interest of Swedish track athletes as they trained. He used the hills and forests of Sweden to develop a game to train the athletes over a cross country course where they had to choose their route. On March 25, 1919, Major Killander held the first orienteering competition outside of Sweden. There were 220 participants in this meet. During the 1920s the sport began to spread through Sweden, Finland, and Norway. In the 1930s the sport was enhanced by the development of the protractor compass by the Kjellstrom brothers, Bjorn and Alvan. The new compass was called the Silva System. Since then, orienteering has grown in popularity throughout the world. Competitions are held on foot, snowshoes, and skis.

Why Orienteering?

Orienteering is the ability to match up a map and a compass with your surroundings so that you can accurately find your way. The sport of orienteering can be an exciting way to challenge yourself both mentally and physically. However, the ability to use a map and/or a compass is also a life skill that allows participants to safely experience many outdoor adventure activities. Imagine yourself skiing through wilderness, confident that you will not become lost. You could sail or sea kayak out of sight of land, comfortable with the knowledge that you can find your way back.

Terminology

Angle of Declination. The angle representing the difference between magnetic North and true (or geographical) North. True North is a fixed location—the North Pole—whereas the magnetic North Pole is a shifting location in the eastern Arctic usually identified as the Hudson Bay area of Canada. This spot is where the earth's lines of magnetic force converge and where the magnetic needle of a compass points. The Canadian government periodically gives an average location of magnetic North. The angle of declination on topographical maps becomes greater as the distance increases east or west of a line passing south from the North Pole through the Hudson Bay area. The only area in which magnetic North and true North are approximately the same are those areas that are aligned vertically with the Hudson Bay area or directly on that line.

Aiming Off. A technique that may be used when the destination is located on a feature such as a river or ridge that is at right angles to the direction of travel.

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The orienteer can aim off to one side of the destination and be certain which way to turn when he or she reaches the feature.

Attack Point. A large, prominent visible feature on the map and in the field from which the final approach to the destination can be made.

Azimuth. This is the orienteer's term for direction. It can also be called a bearing. Azimuths are most often measured in clockwise degrees with North equal to zero degrees and South equal to 180 degrees.

Base Point. The place where an orienteer stands to navigate towards his or her destination. The base point can be a control point or an attack point used to sight the next control point.

Bearing. Sometimes called the azimuth, the bearing is the direction of a given point or destination measured in degrees from North going in a clockwise direction.

Beeline. A straight line.

Cardinal Points. The four basic directions on a compass: North, South, East, and West.

Catching Feature. A long, natural or man-made feature running perpendicular to the orienteer's direction of travel.

Contour Interval. The vertical distance in height between contour lines on a topographic map.

Control Point. The marker or place to be located in orienteering. It is designated on the orienteering map.

Declination. The degree difference between magnetic North and the true North direction.

Elevation. The height (vertical distance) above sea level.

Feature. A landform or structure that is identifiable on a map.

Handrail. A linear feature that runs parallel to the orienteer's direction of travel. It is used to navigate to a control or attack point.

Legend. An illustrated description of symbols used on a map. It is most often located on the lower margin of the map.

Magnetic North. The direction to the magnetic north pole located approximately at Hudson Bay in Canada.

Map Symbols. Designs found in the legend on a map. These designs represent landscape features on the map.

Meridians. Real lines on a topographical map or imaginary lines in the terrain running true North and true South.

Minute. A geographical unit of measure equal to 1/60th of a degree.

Orienteering. The skill or process of finding your way in the field using both a map and compass.

Pace Counting. A method used to measure distance traveled by counting each time the same foot hits the ground as you are walking.

Quadrangle. A topographic map produced by the U.S. Geological Survey Department.

Scale. The relationship of a distance on a map to the actual distance in the field. It is usually expressed as a proportion. A common proportion is 1:24,000. This means that 1 inch on the map equals 24,000 inches or 2,000 feet in the field.

Shoot A Bearing. The act of determining the direction of travel in degrees from North by using a compass and visible landmarks or control points.

Topographic Map. A map that shows physical features in minute detail.

True North. Geographic North—the North Pole—where all the lines of longitude meet.

Equipment

To begin orienteering, you need a good protractor compass and a topographic map of the area you will be visiting. A good compass can be purchased at a wilderness outfitters or a sporting goods store. You may also write directly to Silva Orienteering Services, USA Box 1604, Binghamton, NY 13902, for a compass catalogue. Be sure to purchase a protractor style compass with a clear base plate. Topographic maps are produced by the U.S. Geological Survey. These maps, called quadrangles, come in two sizes: 15-minute maps and the more detailed 7 1/2-minute maps. The 7 1/2-minute quadrangle map covers an area bounded by 7 1/2 minutes of longitude and 7 1/2 minutes of latitude. The scale on the map is 1:24.000. This means that 1 inch on the map represents approximately 1 mile. Wilderness outfitters, sporting goods stores, or camping stores often sell these maps for local hiking areas. If you cannot find a quad for a specific area, request a free topographical map index circular for that area's state, a free folder describing topographical maps, and a free topographical map symbol sheet from the National Cartographic Information Center, 507 National Center, Reston, VA 22092. When ordering the particular quadrangles, request a woodland copy. Mature forests are shown in green on these maps.

Besides the regular equipment for outdoor activity, it is helpful to carry a whistle in case you get lost and, if possible, a cell phone. Always make sure that you tell someone where you are going and what time you expect to be back.

How Do You Start?

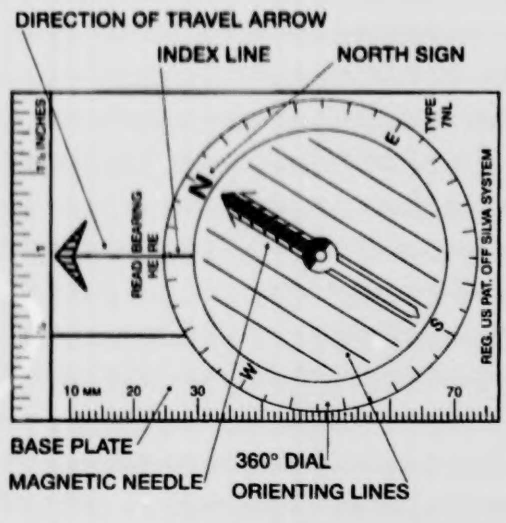
Getting from point A to point B when you can see your goal the whole time is easy. It doesn't require any extra equipment other than your eyes and your legs. But what if getting from point A to point B required that you go through unfamiliar territory where you cannot see your goal? Understanding the workings of a compass will keep you from becoming lost. See Figure 1 for a diagram of a compass. Become familiar with it.

A good beginning drill to practice simple map reading can be seen in Figure 2. Students can pair up and find the points on the map. This map happens to be in a gymnasium. However, any room or contained outside area will do. The object is to find the colored dots represented by the numbers on the map and then record the color of each point. A competition could be made of this activity by applying a time limit or a prize for the first group to fill out the map correctly.

Where Is North Really?

The world was long ago divided into the four cardinal points: North, South, East, and West. These points have been set on a circle that has 360 degrees. Traditional North is 0 or 360 degrees, East is 90 degrees, South is 180 degrees, and West is 270 degrees. To use a compass properly, it is necessary to understand a few facts. First, the needle on a compass is magnetized and attracted to something. This source of attraction is a large magnetic field (probably a very large deposit of metal in the earth's crust near Hudson Bay in Canada). The direction in which the needle points is called Magnetic North. The North Pole, or True North, represented by the N on the compass dial (sometimes called the Compass Rose), is approximately 900 miles north of Magnetic North. Because of this difference, the North on your compass may be different from the North that your compass needle points to. The difference between the North Pole or True North represented by the N on your compass and the Magnetic North that the compass needle is attracted to is called the angle of declination. See Figure 3 for a diagram of the angle of declination as it will appear on a topographic map. In order to use a compass successfully, you must know the actual angle of declination for the area you are in and how to correct for it on your compass. If you are using a topographic map with your compass, then the angle of declination will be listed on the map.

Figure 1. Protractor Style Compass



Using a Compass to Find Your Way When You Can See Your Destination at Least Part of the Time

If you can see where you are going at all times, there is no need for a compass or map. If you cannot, then a compass is helpful to keep you going in the right direction even when you cannot see where that direction is. When trying to find a simple bearing (a direction measured in degrees) from point A to point B, angle of declination does not need to be determined. Instead you must find the degree variation from point A to point B with the North on your compass held as a constant. Confused? It is really quite easy. Determine a landmark in the direction that you want to travel. Hold your compass in front of you and point the direction of travel arrow, which is on the base plate of your compass, at that landmark. Now turn the compass dial so that the N representing North on the compass lines up with the red (magnetized) end of the needle. You will now be able to read the bearing for your direction where the line of direction arrow meets the dial. This is called the index line. To get to your goal, walk in that direction while keeping the compass needle aligned with the N on the compass. It is helpful to stop every

Figure 2. Finding Points on a Map

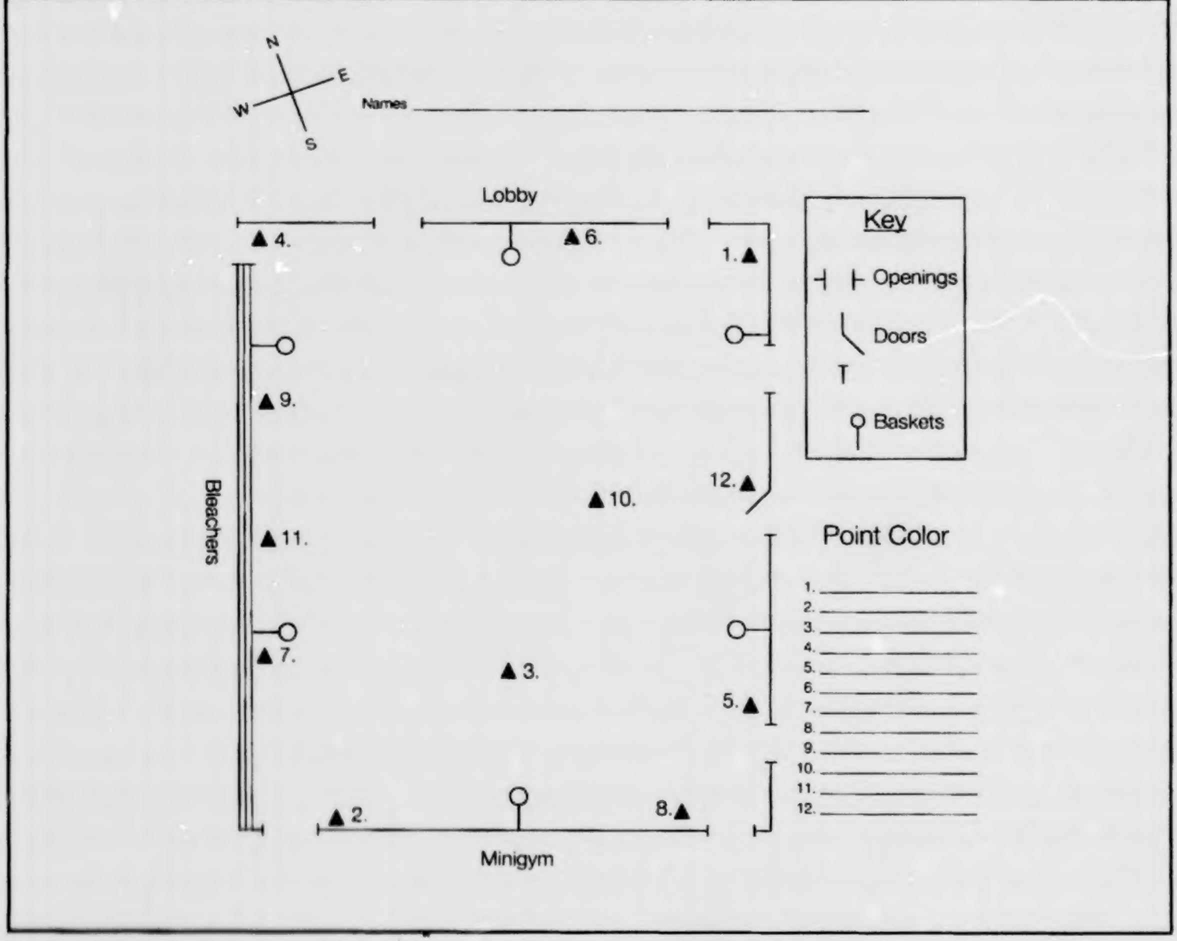

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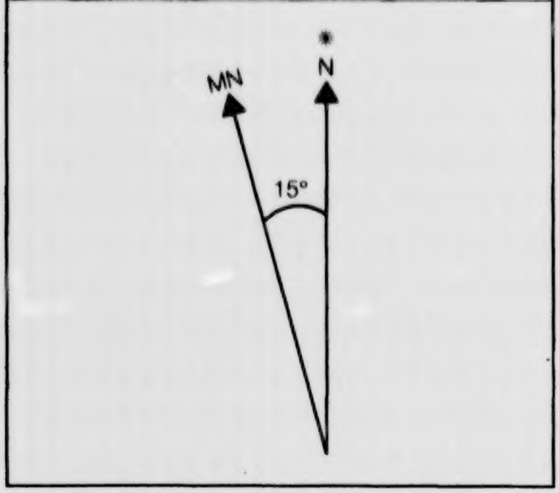
Figure 3. Angle of Declination



once in a while to check that you are still on course. You can do this by repeating the steps above.

Using a Compass to Find Your Way When You Know the Direction But Can't See Your Destination

What happens if you know your bearing but cannot see your destination? Here's how to find your way. Turn the base plate of the compass so that the direction of travel arrow is lined up with the bearing that you have been given. Holding the compass in front of you, with the line of direction pointing away from you, turn your whole body so that the magnetic needle on the compass lines up with the N on the compass dial. When this is accomplished, you will be facing in the direction that you wish to travel. To get to your destination, walk

in the direction you are facing. It is helpful if you can pick out a distinguishing feature in the same direction and walk toward it. Stop once in a while to check your bearing again by repeating the steps above.

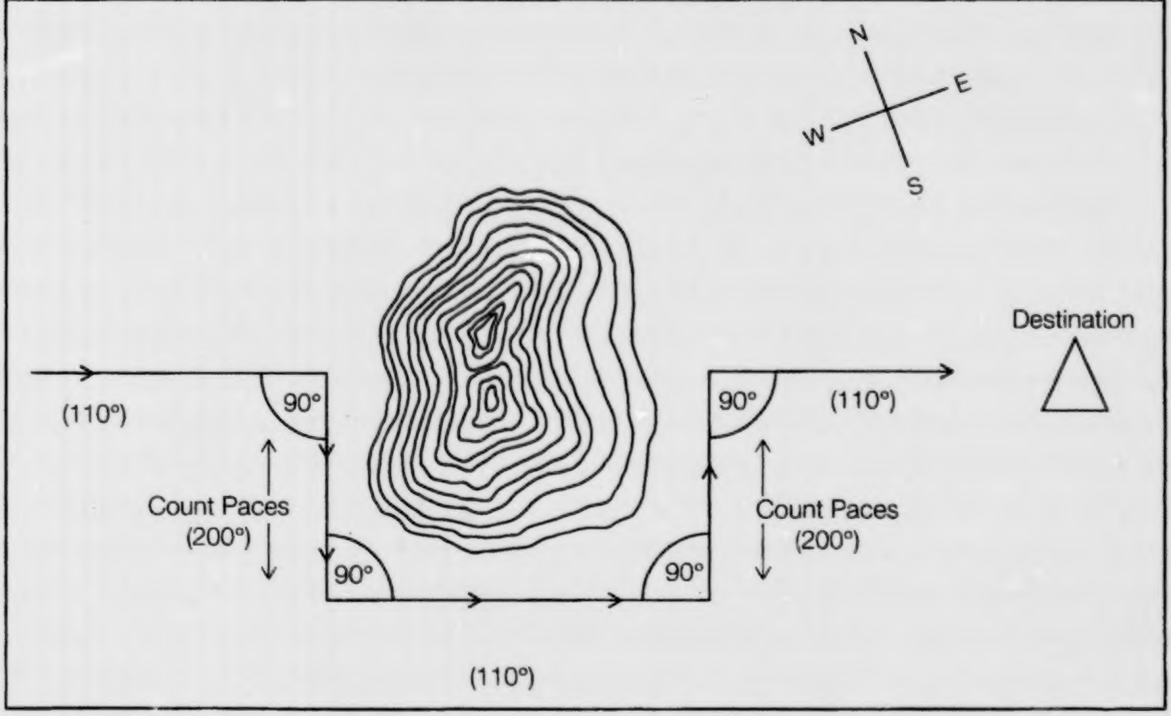
What If There Is Something In Your Way That You Have To Go Around?

Sometimes there is a natural roadblock in your path as you travel to your destination. Roadblocks come in many forms such as swamps or cliffs. If you cannot travel through or over a roadblock, you must go around it without losing your way. If you can see past the obstacle, then walking around it becomes easier. Sight a landmark that you can see on the other side. Walk around the obstacle until you reach that landmark. When you get there, take your next bearing to your destination and continue. You can double-check your accuracy by taking a back reading to the point you just came from. When you can't see around the roadblock, then you must employ a different tactic. You can get around the obstacle by walking at right angles to it. First turn 90 degrees from your route and walk until you are past the obstacle. Make sure to count your steps when you are walking. When you are past the obstacle, turn back to your original bearing. Walk until you are beyond the obstacle again. Now turn at right angles in the opposite direction from your original turn and walk the same number of steps as the first leg of the detour. You have now walked three sides of a rectangle around the obstacle. You should be back in line with your original bearing. Turn one more 90-degree angle back in your original direction and take a bearing to make sure that you are on track. Figure 4 is an illustration of this procedure when a steep hill is in your path.

How Do You Get Back To Where You Started?

If you want to retrace your steps to your starting point, turn the direction of travel arrow 180 degrees from the bearing that you have been following. Align the compass needle with the North on the compass face and travel in the new direction. Be sure to pick out a landmark in your new direction of travel and check your bearing when you reach it. Continue to take bearings as you continue back.

Figure 4. Getting Around an Obstacle



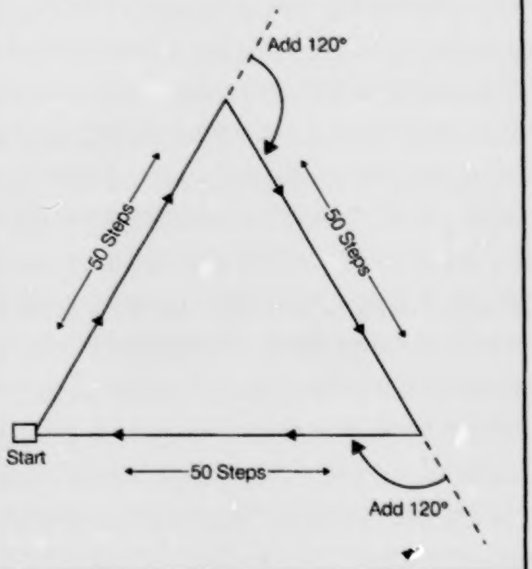
Adjusting Your Bearing for Angle of Declination

Sometimes it is necessary to adjust the simple bearings that you tried above for the difference between Magnetic North and True North (angle of declination). It is necessary to do this, for example, when you are given a bearing that includes a correction for Magnetic North. The simplest way to do this is to add or subtract the necessary degrees from your bearing and align your direction of travel arrow with the new setting. If the angle of declination for the area you are in is to the East, you must subtract the declination degrees. If the angle of declination is to the West, then you must add degrees to your bearing. For example, if you are given a bearing of 77 degrees and the angle of delineation is 16 degrees to the West, then your corrected bearing would be 77 +16 = 93 degrees. Practice correcting for angle of declination with a partner by asking each other to make corrections for different bearings and angles of declination to the West and to the East.

Try a Walk To Test Out Your Compass Skills

1. This walk can be done anywhere: the gymnasium, the football field, or your backyard. In his book, *Be Expert With Map and Compass*, Bjorn Kjelstom calls this "The Silver Dollar Game." First, place a marker (coin, cone, flag) at your feet. Turn your direction of travel arrow on your compass to a bearing of between 0 and 120 degrees. Walk in that direction for 50 steps. Stop and take a new bearing by adding 120 degrees to the bearing you were just following. Again, walk 50 steps in the direction of the new bearing. Stop and add 120 degrees to the second bearing that you just finished following. Walk 50 steps in the direction of the new bearing. If your walk is fairly even and you have used the compass properly, you should end up right at the marker that you originally placed at your feet (Figure 5).
2. If you are successful with the "Silver Dollar Game," try this compass game. You will need a pencil and a piece of paper for each participant. Place 20 markers (cones, etc.) at 5-yard intervals. It is helpful if they are placed in a North-South direction or an East-West direction. This can be done on a football or soccer field. The markers should be numbered from 1 to 20 in order. Using a compass, stand at one of the numbered markers and choose a bearing while making sure to align the magnetic needle with N on the compass dial. Walk in the direction of the bearing chosen and count your paces. Then stop and choose a second bearing that will take you back to one of the 20 markers. You should then walk back in that direction and count your paces. When finished, you should record your starting point (marker number), the two bearings, and the number of paces for each leg on a piece of paper. You can then exchange it with a friend. The friend should try to repeat the walk and end up at the correct marker. When this two-legged walk becomes easy, try a three-legged walk (Figure 6).

Figure 5. The Silver Dollar Game



3. As confidence grows, a third drill can be tried. Set up a miniature orienteering course where students can travel from checkpoint to checkpoint, also called controls, in the open so that they can see their way back to the stating point if they become confused. The directions to the next checkpoint can be placed at each checkpoint. Students can start at any of the checkpoints or controls and successfully complete the course. The beginning course can be made even

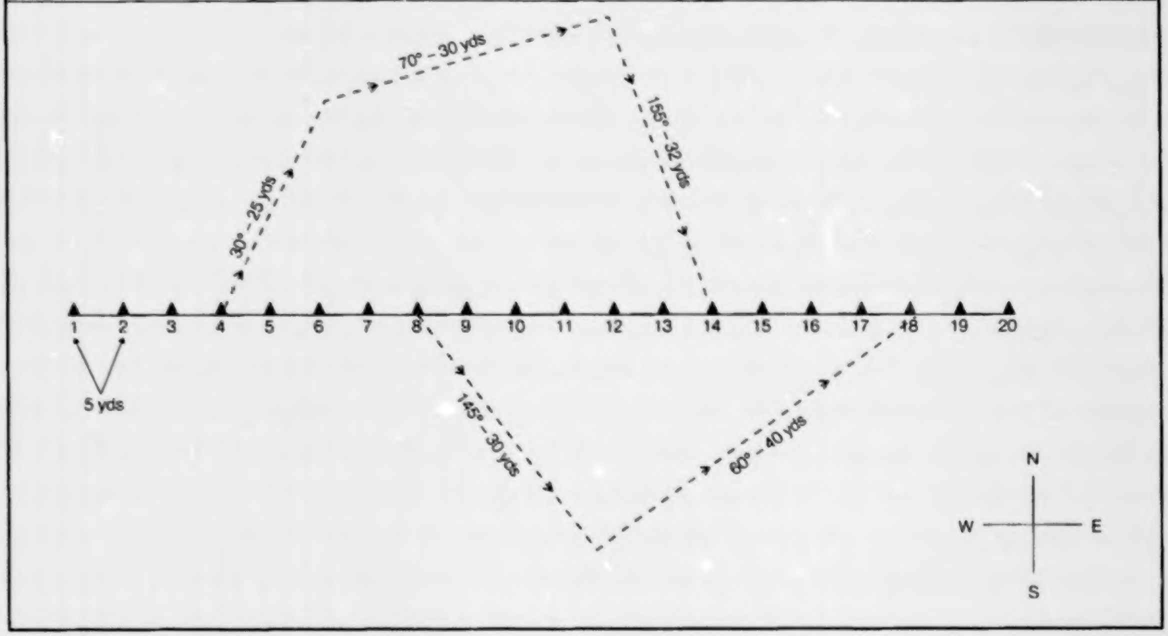


Figure 6. Repeat the Walk

more interesting by having a clue at each checkpoint (control) that the beginning orienteerer must harvest in order to solve a question. For example, the word "magnetic" could be spelled out by having each letter at a checkpoint. As the orienteer becomes more skilled, a combination of time and accuracy can be used to make the course a contest (Figure 7).

If you would like more practice, you might want to try the "Online Orienteering Program and Activity Guide" recently developed by Sportime International. This program is useful in training students to determine distance, angles, and bearings. For more information, contact Sportime International, 1 Sportime Way, Atlanta, Georgia 30340.

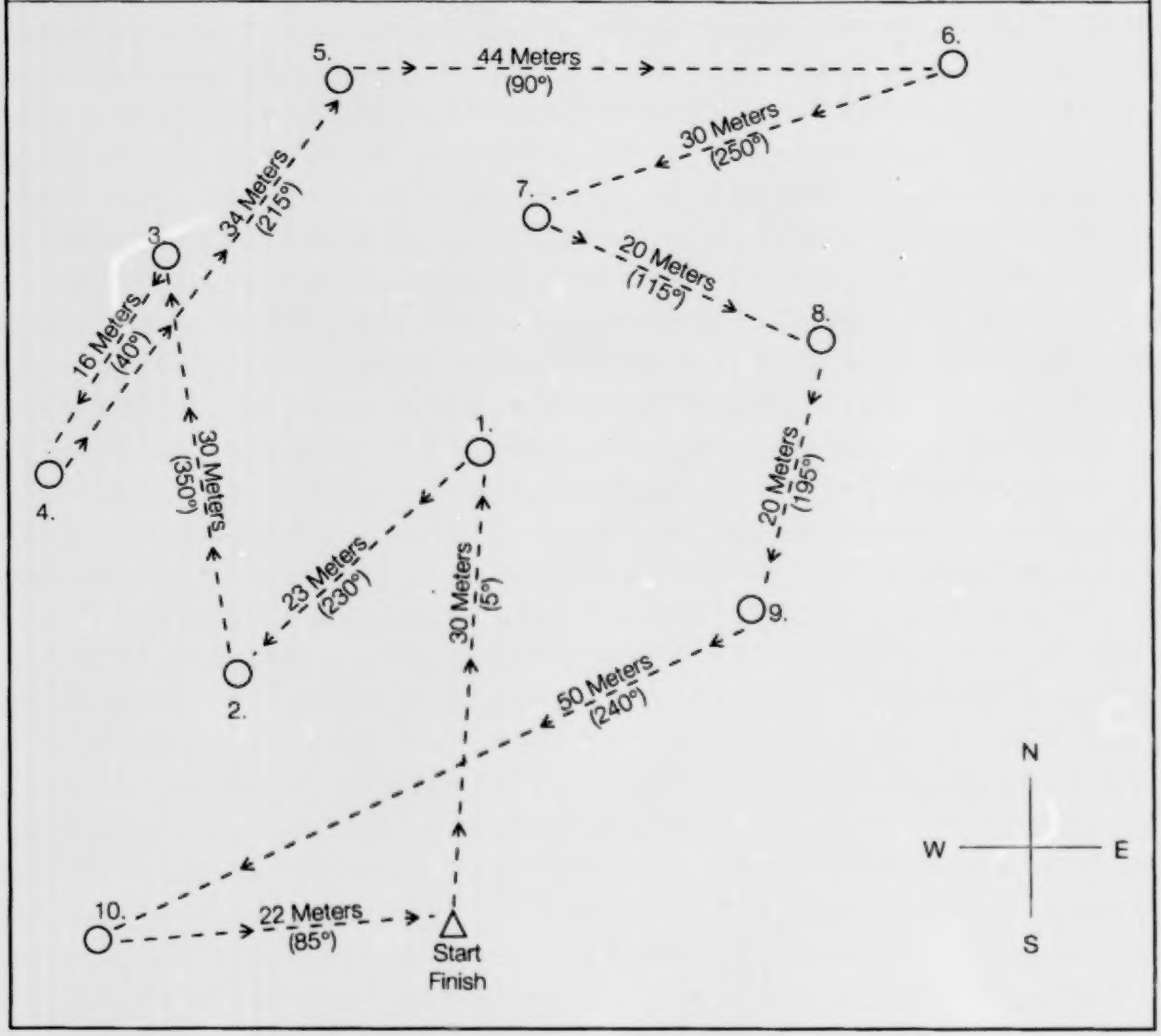
Map Reading

A topographic map will show you what the land looks like if you were to fly over it, take a picture, and convert that picture to symbols and forms that help you to view the area as if it were three-dimensional. The legend on the map identifies these symbols. Usually, green and white areas mark forests and open lands, blue represents water, and black represents buildings, roads, trails, etc., that are man-made. The brown contour lines represent height differences for hills, cliffs, and depressions. The closer together the contour intervals, the steeper the terrain. The contour interval is the vertical distance between lines and may be anywhere from 10 to 80 feet. If you examine the brown lines more closely, you can see a pattern. When you reach the smallest circle, you have a mountaintop or ridge. On the margin of the map, you will find a lot of helpful information such as the scale of the map, which is the relationship of the size of the map to the area it represents. This is very important in determining distances that you will have to travel. Also, on most maps there will be a description of the angle of declination for that area. It is important to become familiar with the topographic map and all of its symbols. Study a topographic map and plan some trips at your desk with it. For example, look for the shortest route from A to B, the longest route, the tallest mountain, the steepest cliff, a marshy area, or the most populated area.

Now That You Have Your Map, How Do You Find Your Direction— Or Where Is North Anyway?

Topographical maps are designed with True North always at the top of the map so you have a reference point for the map. One way to orient your map is to

Figure 7. Finding Checkpoints


5.
44 Meters
(90°)
6.
30 Meters
(250°)
7.
34 Meters
(215°)
3.
20 Meters
(115°)
8.
16 Meters
(40°)
30 Meters
(350°)
1.
4.
20 Meters
(195°)
23 Meters
(230°)
30 Meters
(5°)
9.
2.
50 Meters
(240°)
N
W
E
10.
22 Meters
(85°)
Start
Finish
S

look for a prominent landmark. Now find that landmark on the map. Once you have done this, simply turn the map so that the landmarks are lined up. If you can't find a landmark, then it becomes necessary to use your compass with the map. But before you can do that, you must make the map and your compass speak the same language.

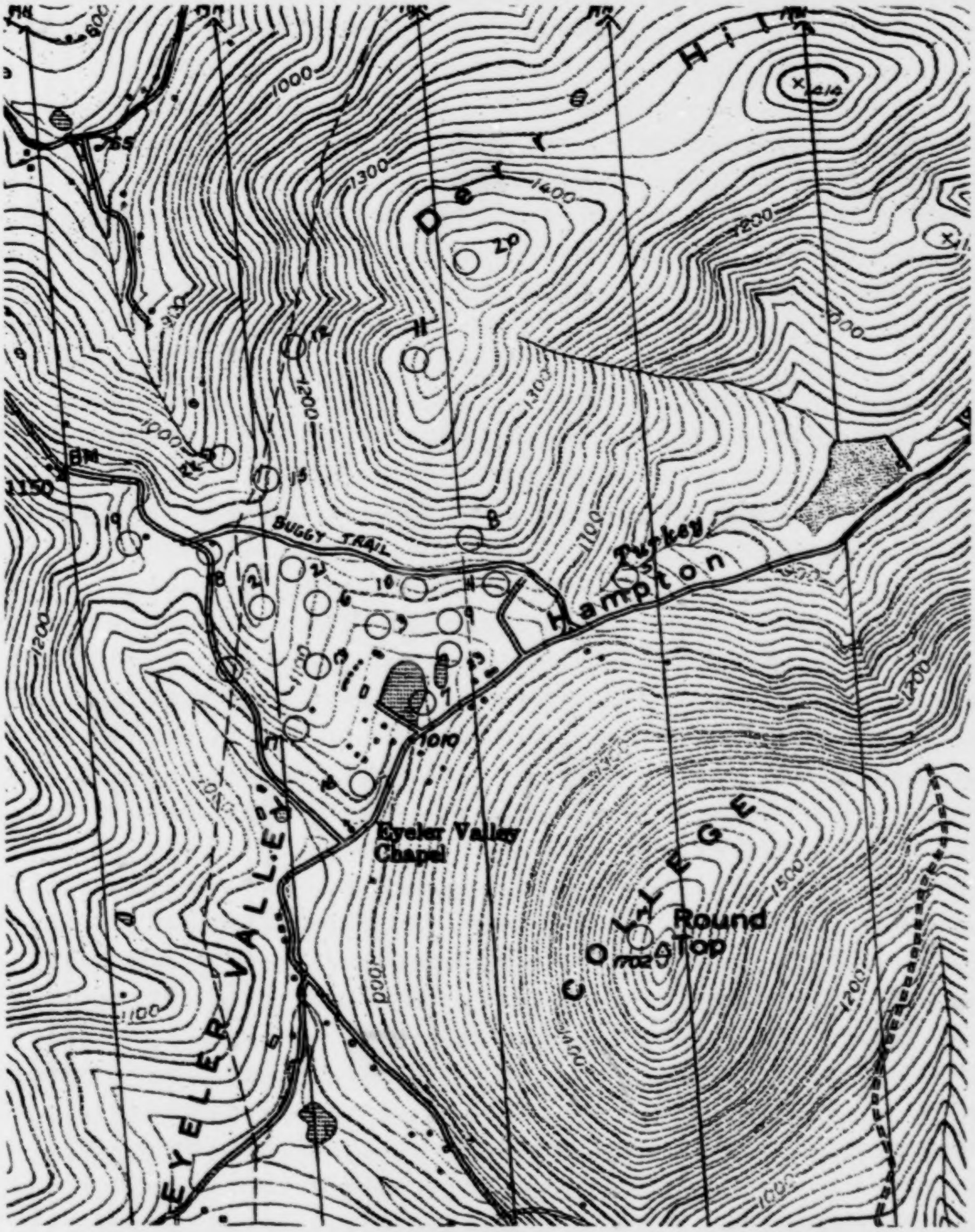
Preparing Your Map

In order to use your map more easily, locate the Magnetic North arrow in the margin. Draw a line extending the Magnetic North line to the top of the map. Draw parallel lines to your first line about 1 to 2 inches apart across the entire map. You have now provided yourself with a line of direction for Magnetic North so that you can orient you map and your compass to the same direction (Figure 8).

Using Your Map and Compass Together

Once you have prepared your map by drawing Magnetic North lines on it, you will have a constant reference for Magnetic North whenever you look at your map. Place your compass on your map so that the North on the compass is lined up with the lines that you have just drawn. Turn both the map and the compass until the red compass needle lines up with the North on the compass rose. The red compass needle should also line up with the lines you have just drawn

Figure 8. Preparing Your Map


MN
Deer Hill
1000
1300
1400
1200
1614
20
11
12
15
BM
1150
19
Buggy Trail
Turkey
Hampton
1100
8
18
21
22
10
14
9
1010
17
Eyeler Valley Chapel
Eyeler Valley
College
Round Top
1702
1500
1600

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on your map. Your compass and map now agree on direction. If you can see a landmark, the direction should be the same on your map. Now you are ready to take a trip with your map and compass.

Remember, a trip from point A to point B will be measured by a bearing, which is the difference between the two points on a circle measured in degrees when Magnetic North is kept constant.

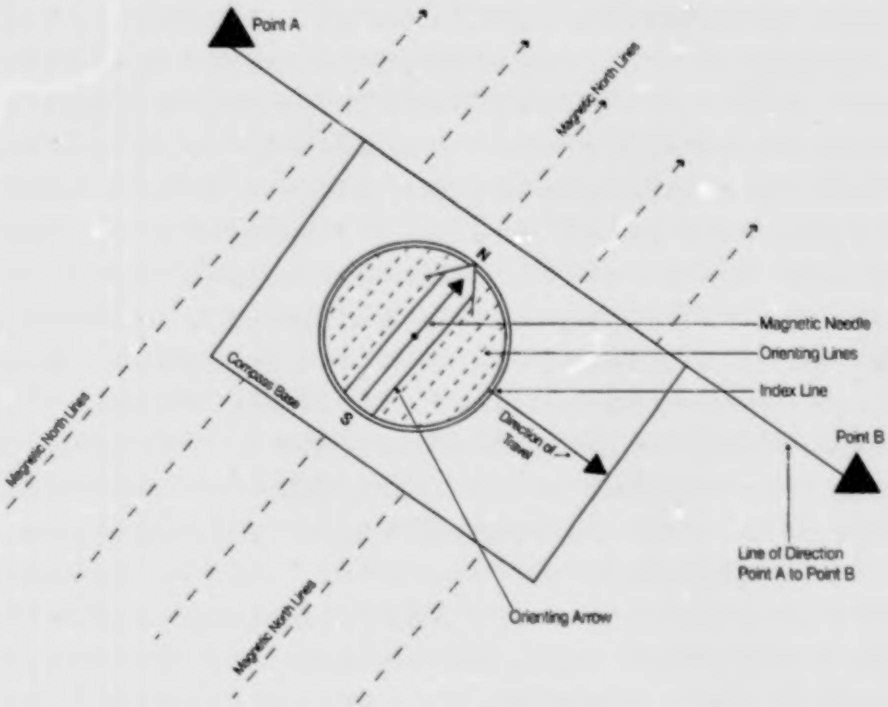
Choose a destination on your map. Use the base plate edge of the compass to connect where you are to the destination (i.e., point A to point B) (see Figure 9). Because the base plate edge and the line of direction on the base plate are parallel to each other, they are pointing in the same direction. Now turn the compass dial until the N lines up with the Magnetic North lines that you have drawn on the map. Read the bearing over the line of direction arrow. That is the bearing that you will need to follow to get to your destination.

Once you know your bearing, hold the compass level with the direction of travel arrow pointing straight ahead. Turn your body until the red end of the compass needle lines up with the N on the compass dial. The direction of travel arrow now points to the destination. Look in that direction and try to find a landmark. Walk in the direction of the landmark. When you reach the landmark, take another bearing and repeat the procedure until you get to your destination (Figure 9).

A good way to practice this skill is to find a map of an area that you are familiar with and take short trips from one point to another. Choose a location on the map that you are familiar with and plan a walk to it. Try walking to a location where you will have to go around an obstacle and practice your direction skills and pacing.

When you plan your trips, try to notice features on the map that run parallel to your route. These features are called "handrails." Roads, trails, streams, and power lines make excellent handrails and will help you keep on course. A feature that runs crosswise to your path is called a "catching feature." A catching feature can direct you to your destination by letting you know when to turn; it can also tell you that you have gone too far.

Figure 9. Using Your Map and Compass Together



If your destination is along a road or a stream and your approach is from a position that is at right angles or broadside to the destination, then you can use a technique called "aiming off." Instead of heading directly to the point and possibly missing it, aim enough to one side so that, when the handrail or catching feature is reached, you need only turn and follow it to reach your destination (Figure 10).

You Have a Map and a Compass, But You Are Not Sure Where You Are

Sometimes you may find yourself in a situation where you are not quite sure where you are. You can pinpoint your position by sighting two landmarks and finding them on your map. Once you have established the two landmarks, point your direction of travel arrow toward one of the landmarks and turn the compass dial so that the magnetic needle points to north. Now read the bearing at the index line.

Keeping the bearing the same, place the base plate edge of your compass so that it touches the landmark on your map. Now turn the compass, still keeping the base plate in contact with the landmark, until the magnetic needle lines up with the Magnetic North lines that you have drawn on your map. Draw a line along the base plate of the compass from the landmark across the map. Repeat the same process with the second landmark. You will notice that the two lines you have drawn will cross. The point at which they cross is your location. This technique is

Figure 10. Using Handrails and Catching Features

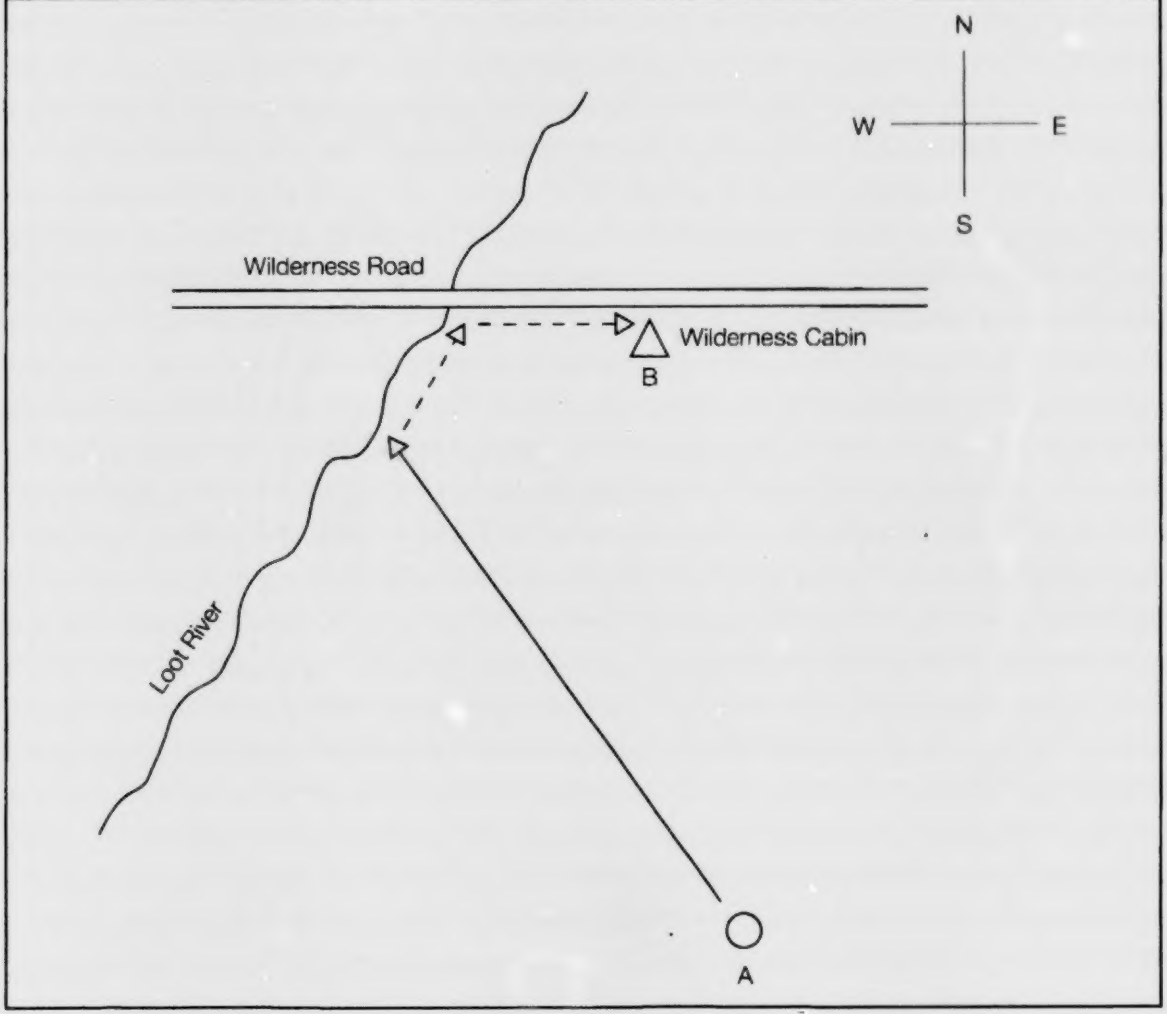
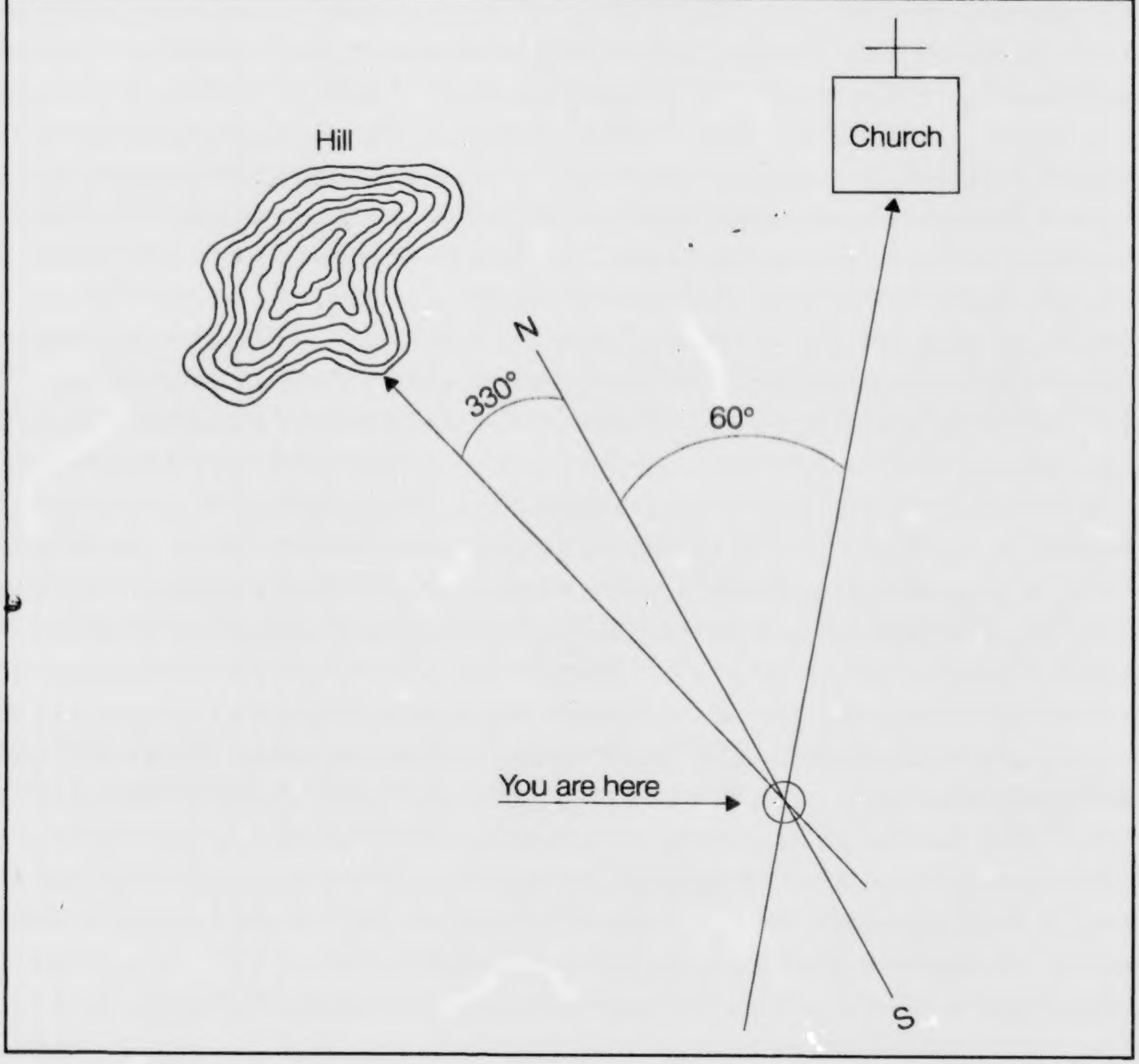


Figure 11. Taking a Crossbearing



called taking a crossbearing. It can also be used to pinpoint a favorite fishing spot or a good climbing cliff for return trips (Figure 11).

Now that you have mastered some of the basic skills of a map and compass, get out and enjoy yourself. Whether you are involved in an outdoor adventure sport or challenging yourself in orienteering competition, you now have the skills to participate safely. If you are interested in learning more about the sport of orienteering, contact Orienteering Services USA, Box 1604 Binghamton, NY 13904 or The U.S. Orienteering Federation, P.O. Box 1039, Ballwin, MO 63011.

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CHAPTER 16

Self-Defense

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Introduction

It is, unfortunately, possible to open a newspaper on any day and read about physical assaults, rapes, muggings, and other examples of personal violence. No community is immune, and every person can be considered a potential victim. Self-defense becomes, therefore, a much-needed course. Violence is a fact of life in even the safest of communities. The goal of a self-defense course is not to create fear but to develop self-defense skills that can be used if students are faced with a situation where their personal safety is jeopardized. More importantly, a level of confidence should be developed that will translate into mental preparedness to meet danger situations that may be confronted. Students must understand that physical skills alone have limited value. There is always the possibility that the attacker or attackers will have more strength and/or physical skills. The goal of psychological preparedness, therefore, becomes of prime importance in a self-defense class.

Students must know when to use the many defensive techniques available and be able to select the best maneuver for the danger situation that is encountered. They must also realize that there are situations when passivity rather than aggressiveness is the best defense. Gaining insight into the best approach to take in danger situations is an important outcome for students. Sometimes trickery, stalling for time, or immediate flight is a better alternative than using physical force.

There is a difference between skills learned in a self-defense class and the skills learned in most other physical education courses. In other courses, the goal is to develop skills that will be used on a regular basis, while in school and throughout life. Self-defense, on the other hand, must be approached from an entirely different perspective. The skills learned are to be used only in emergency situations when personal safety or the safety of another person is threatened.

Part of psychological preparedness is to gain confidence in one's ability to handle a dangerous situation. The physical skills that are learned in class give students a better understanding of the physical capabilities that they have. An emphasis in a self-defense class should be on increasing students' confidence through the realization that they do have the ability to defend themselves and can cope with dangerous situations. It is important to incorporate activities that will improve physical skills such as agility, balance, and body control. These attributes are an integral part of personal defense skills.

Techniques for defending oneself have been used as long as history has been recorded. Defensive techniques were necessary for survival in ancient times and were learned by children at an early age. This need decreased as civilization progressed into modern times. Unfortunately, physical danger continues to be a concern in even the most advanced societies, and it is necessary to develop skills, both physical and mental, that can be used in times of danger. Practicing self-defense techniques develops physical skills and the mental alertness that is needed when threatened with violence by another individual or group of people.

Even with the advancement of civilization, violence continues to cause many problems throughout the world and includes the highly technological cultures also. It is a teacher's responsibility in a self-defense class to inculcate in each student a respect for others and to encourage students to become involved in community activities and organizations that strive to

decrease the amount of violence found in communities and in the world. An important principle of self-defense is for anyone, no matter how skilled, to do everything possible to avoid a situation in which violence may result. This is the first rule to follow. The second rule is to walk, or run(!), away from danger situations before they occur. This attitude of prevention must form the foundation for learning self-defense.

Why teach self-defense skills when it is possible to teach judo, karate, or some other martial art? There are basically two advantages. First, using a combination of techniques is better than being restricted to one style. The other reason is that an activity such as karate requires a much higher level of coordination, strength, and agility. It takes years of practice to become skilled in using karate self-defense techniques, and the high level of skill that is needed for success requires continual practice. Judo and karate are more than self-defense techniques. They are excellent sport activities that are fun to learn and provide enjoyable competition. The primary skills of self-defense are those that will disable an attacker. They are not used for fun.

Cautions

It is important to introduce the self-defense unit by explaining the purpose of self-defense skills and emphasizing when it is legal to use physical force on another person. People have a right to defend themselves. Everyone should be able to live a life free from the fear that accompanies intimidation and physical abuse imposed by others. Self-defense techniques should not be used to violate the rights of others or to injure another person unless personal welfare or someone else's well-being is threatened.

Laws governing the actions people may take in defending themselves vary from state to state. In general terms, a victim must believe that bodily injury is about to occur, and there must be apparent danger to the victim or another person. In these situations, all force and means that are considered necessary to prevent injury may be used. The same principles apply when saving a third party from death or injury. Deadly force may be used only if life is in danger and is not to be used in other situations such as when property is being damaged or stolen. Retaliation can be used only up to the point necessary to stop the attack. The intended victim is not permitted to use excessive force for defense or for punishment. Verbal abuse is not a legal cause for physical retaliation unless an act is threatened that justifies a defensive action.

It must be emphasized and re-emphasized that a person has the responsibility to avoid violence whenever possible. Legally, however, this does not mean that a person has to retreat before using aggressive defensive tactics if this is the best way to handle a dangerous situation. The following principles should be kept in mind:

- Anticipate dangerous situations and use every possible measure to prevent them from occurring.
- Defuse dangerous situations if at all possible.
- Accept responsibility for a problem even if you may be in the right. Don't let your ego contribute to a dangerous happening.
- Walk away from dangerous locations.
- Run from danger rather than get into a situation where self-defense tactics are required.
- Use self-defense tactics only as a last resort.

Safety

A number of safety guidelines should be emphasized when learning self-defense.

These guidelines are to be followed at all times.

1. Tap for safety. Tapping is the universal signal to stop. It is not necessary to suffer extended periods of pain to become successful in executing self-defense techniques. Tap the mat, a partner, or oneself to stop the action. It is imperative that participants stop instantly when the tapping signal is given. It will give confidence to try different skills if this safety procedure is explained during the first class period.
2. Proceed slowly when learning the techniques. The skill must be executed smoothly before entire movement can be controlled during practice. Increase speed after control is developed.
3. Learn how to fall properly. Skill in falling is crucial for learning self-defense techniques safely.
4. React properly to pressure. Go with the pressure whenever possible.
5. When starting a unit on self-defense, it should be emphasized that there must never be an attempt to injure a partner in practice sessions. Full-scale self-defense maneuvers should be used only in danger situations.

6. Body blows and jabs should never be practiced at full force on a partner. Use dummies and other teaching aids when learning these techniques.
7. Class members should wear comfortable physical education clothing that permits easy movement and does not have buckles or other items that could cause injury when practicing self-defense techniques.
8. Do not wear jewelry or other accessories.

Philosophy of Preparedness

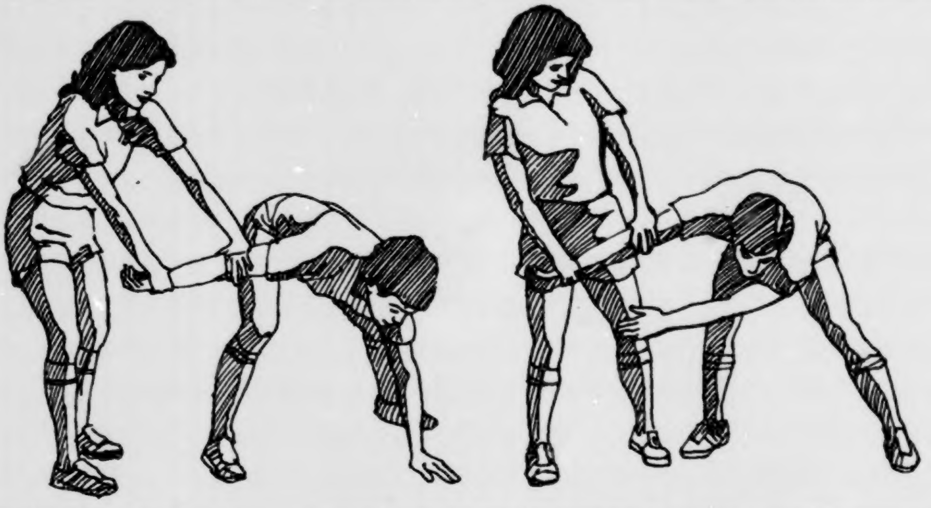
The goal in a self-defense class is to do more than develop self-defense skills. Mental and psychological preparedness has an equally high priority. It is, therefore, important that activities such as reviewing of newspaper articles describing assaults; viewing pertinent videos, films, and TV shows; and holding class discussions emphasizing mental and psychological readiness be interspersed with skill development.

Self-defense is not the ability to use sheer strength to stop an attack. It is the ability to remain calm and choose the best alternative or combination of tactics. One of the best ways to accomplish this type of "coolness" and inner strength is for students to find out that their bodies are capable of performing at a much higher level than they realized was possible. It is, therefore, important to incorporate tumbling skills and weight-training principles into a self-defense class. It is appropriate to teach self-defense in conjunction with (or immediately following) a weight-training or tumbling unit because there is a valuable correlation between the skills learned. Not only will the increased agility and strength from these other activities assist in executing self-defense tactics, but students will gain insight into the physical potential that they have. This realization can result in a changed attitude and permit students to have confidence that they can be physically assertive if the need arises. Students must have confidence in their physical abilities. Learning to perform physical skills they didn't know they could do contributes significantly to a state of mental and emotional readiness.

Another factor that must be considered when learning self-defense is the inability many people have to injure another person even if they are being attacked. This is part of the mental preparedness that is an integral part of a self-defense course. Students, even the mild-mannered ones, who would never think of hurting another person must be willing to seriously injure someone when their safety is being threatened. It must be emphasized that the eye gouge must be deep and forceful, the knee kick disabling, and the holds used to incapacitate an attacker. Use dummies and other teaching aids so full force can be practiced.

Every person has the right to live without having to change his or her lifestyle because of the possibility of being attacked. A good self-defense course destroys limitations rather than imposing restrictions, but it is still important for class members to discuss the common sense safety procedures that should be followed.

Figure 1. Tapping Techniques



Areas that should be included in this facet of a self-defense course include the following:

- Being alert to your surroundings
- Knowing how to be safe in your home
- Dangers when using a car
- Walking in deserted areas
- Getting acquainted with a new town or city
- Traveling alone
- Meeting strangers
- The importance of proper body carriage (projecting a confident, assertive demeanor will reduce the chance of being a victim).

Learning Procedure

Work in pairs when learning self-defense skills. It is preferable to rotate partners during the course so that you experience size and strength differentials as well as have the opportunity to practice with a partner of the opposite sex. A partner should provide feedback to give an accurate evaluation of success in executing the skill being practiced. It is also important that partners give appropriate resistance so the student practicing the skill will get a realistic indication as to whether the execution would be successful or not. Start off with each partner practicing the self-defense move that is being learned. When both can complete the move properly, one will be the attacker and the other will use the self-defense technique. Then alternate roles. Start by going through the skills slowly and gradually increase speed until running through the maneuvers at full speed. Remember that all dangerous skills are acted out; they are never carried out with full force against a partner.

This chapter is arranged to cover the major categories of self-defense skills. After learning the proper stance and gaining a basic knowledge of the vulnerable body parts, begin practicing the basic skills found in each section of this chapter and learn skills in each category. It is best to learn one or two techniques in each area rather than to cover all the techniques in one category before moving to the next.

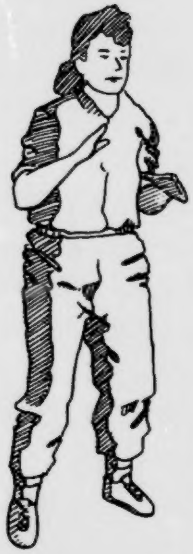
Many skills are easy to use. Start with these so participants will experience success and gain confidence to try more difficult moves. Continue to review even the most basic skills so they become an automatic reaction for each person when his or her partner attacks.

Drill all the self-defense procedures until each person performs the self-defense tactic smoothly and with confidence. When all have this foundation, learning will be enhanced by having two students develop a fight routine. Start by having each partner use two or three skills they have learned in class and design a routine that incorporates these skills. They should practice slowly at first and eventually go as close to full speed as possible. As more skills are learned, more should be incorporated into the routine. Naturally, most of the skills in the routine cannot be completed because they could cause an injury. The teacher can provide guidance so partners move to a different maneuver before there is a danger of injury. One maneuver should flow smoothly to the next one before there is pressure that could stop the routine or injure one of the participants. The constant repetition of moving from one skill to another develops competency with the skills and increases ability to use self-defense tactics as effective fighting tools.

Stance

Students should be prepared to defend an attack from any position in which they find themselves. Regardless of position, balance is extremely important. This concept can be learned by practicing a well-balanced

Figure 2. Basic Stance



standing stance. The principle of maintaining a solid base that gives good stability and maximum protection from kicks and blows and also allows effective maneuverability should be explained. The feet should be about shoulder width apart, with the knees slightly flexed, weight over the legs. This provides a firm base for executing the basic movements of self-defense. The arms should be in front of the body, with the elbows flexed about 90 degrees and the hands slightly cupped. This position assists in blocking blows and puts the hands in position to rapidly retaliate. The feet may be slightly staggered, with one foot in front of the other. A comfortable stance makes it possible to both defend and attack while maintaining good body balance. Any defensive stance should permit rapid movement and give the best possible protection to parts of the body that can be injured.

Vulnerable Body Parts

There are specific body parts that are particularly vulnerable to attack. Students should become familiar with these body parts because jabs and blows can be used effectively in these areas. A high degree of skill is not needed, and a forceful jab or blow will disable an attacker, at least long enough to escape.

Figure 3 illustrates the parts of the body that are most vulnerable. Memorize each of these vital areas. A handout of this diagram showing the vulnerable parts of the body will assist students in developing an awareness of the vulnerable areas.

Although the body has numerous vital areas, there are seven principal targets that should be the first parts of the body to be struck because they are the most vulnerable. Students should practice striking these areas (using simulated targets) first and then expand their targets to include the other vulnerable areas. The seven principal targets (circled on Figure 3) are as follows:

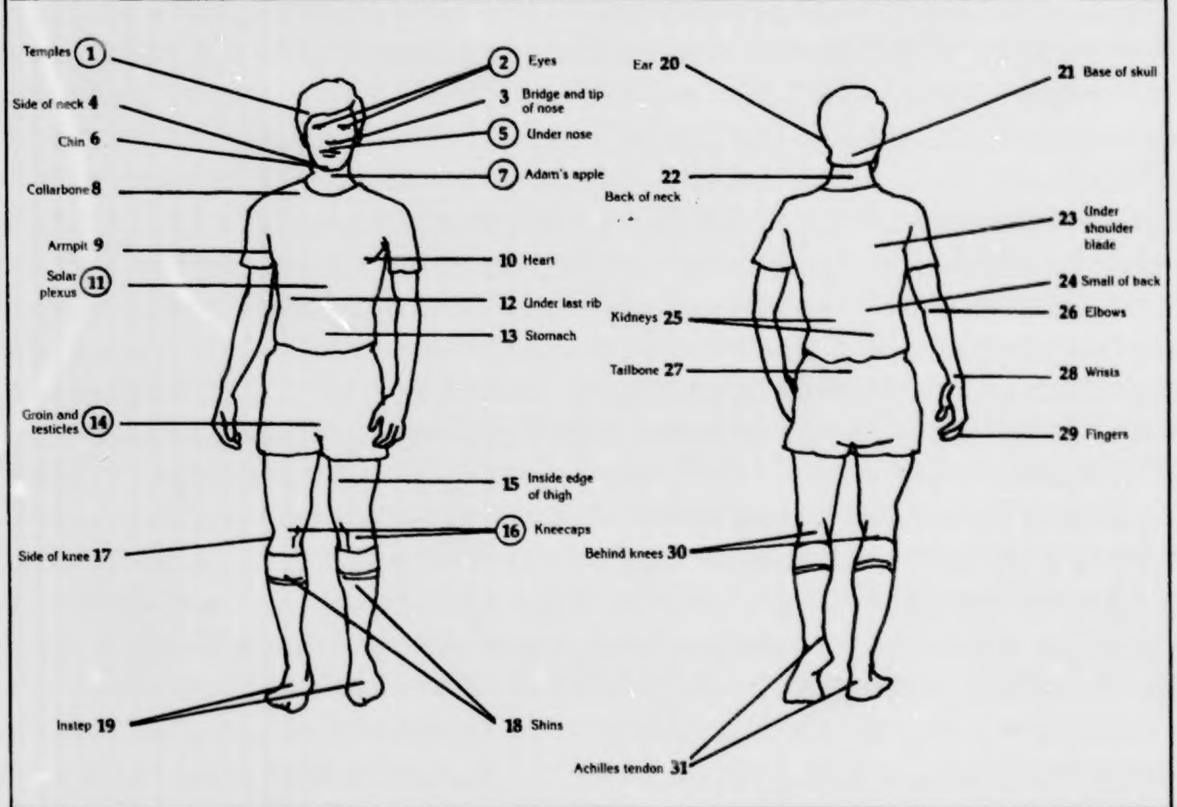
Temple (1)
Eyes (2)
Under the nose (5)
Adam's apple (7)
Testicles (males) (14)
Solar plexus (11)
Kneecap (16)

Many different types of blows can be used effectively on these areas. The eyes are vulnerable to finger jabs or a forceful thumb gouge. The other areas can be struck in a variety of ways. Blows with the fist, heels of the hands, elbow, knee, and foot, as well as a knifelike slash with the side of the hand, can all be effective. (See the section on blows for additional information.) All blows must be used with full force in order to immobilize an attacker.

The 31 vulnerable parts of the body are as follows, with numbers corresponding to those in Figure 3:

1. Temples
2. Eyes
3. Bridge and tip of nose
4. Side of neck
5. Under nose
6. Chin
7. Adam's apple
8. Collarbone
9. Armpit
10. Heart
11. Solar plexus
12. Under last rib
13. Stomach
14. Groin and testicles
15. Inside edge of thigh
16. Kneecaps
17. Side of knee
18. Shins
19. Instep
20. Ear
21. Base of skull
22. Back of neck
23. Under shoulder blade
24. Small of back
25. Kidneys
26. Elbows
27. Tailbone
28. Wrists
29. Fingers
30. Behind knees
31. Achilles tendon

Figure 3. Vulnerable Parts of the Body and the Seven Principal Targets (circled)


Temples ①
Side of neck 4
Chin 6
Collarbone 8
Armpit 9
Solar plexus ⑪
Groin and testicles ⑭
Side of knee 17
Instep 19
② Eyes
3 Bridge and tip of nose
⑤ Under nose
⑦ Adam's apple
10 Heart
12 Under last rib
13 Stomach
15 Inside edge of thigh
⑯ Kneecaps
18 Shins
Ear 20
21 Base of skull
22 Back of neck
23 Under shoulder blade
24 Small of back
Kidneys 25
26 Elbows
Tailbone 27
28 Wrists
29 Fingers
Behind knees 30
Achilles tendon 31

Blows and Kicks

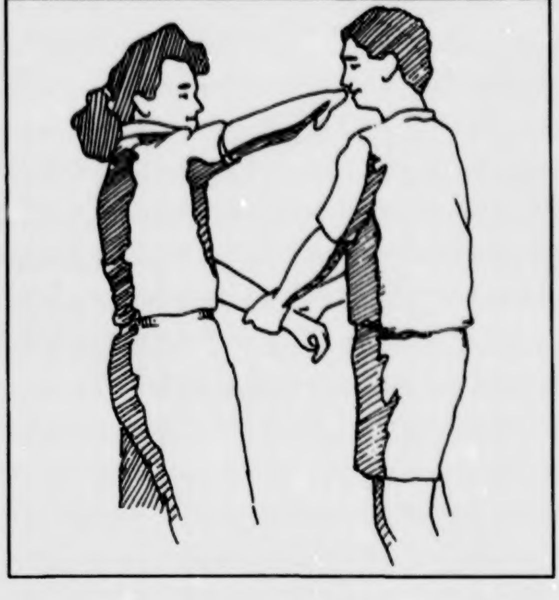
Side of Hand

There are several different hand positions that should be learned. One of the most effective positions for delivering a blow is to hold the hand straight, with the fingers together and extended. Then strike a vulnerable area of the opponent's body with the fleshy outer edge of the hand. The temple, the bridge of the nose, under the nose, the Adam's apple, the side or back of the neck, and the stomach are good examples of body parts where this type of blow is effective.

Closed Fist

A closed fist can also be used to make contact with vital areas. When delivering a blow with the fist, make contact with the second knuckles of the first and second fingers. It is also possible to extend the knuckle of the middle finger and use this weapon against unprotected body parts. Remember that the fist is

Figure 4. Side of the Hand Blow



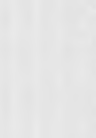


Figure 5. Closed Fist Blow

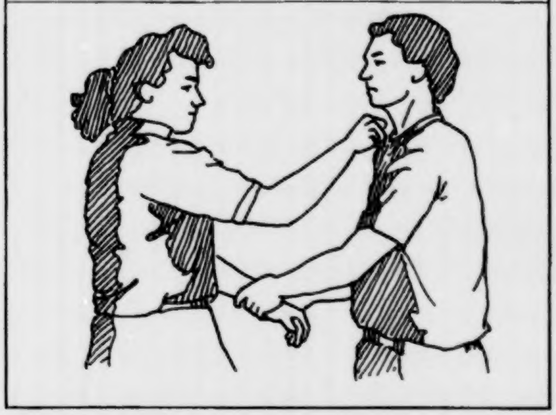
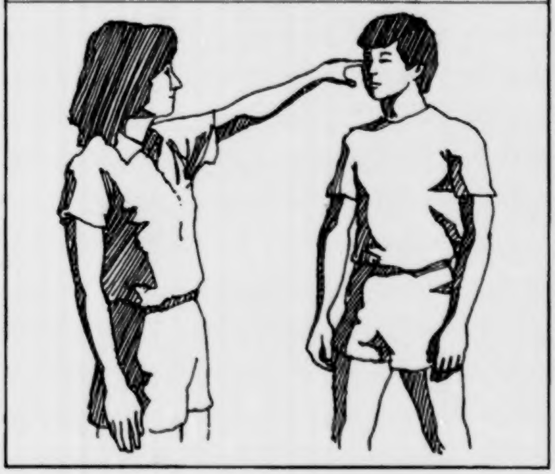


Figure 6. Finger Extension Jab

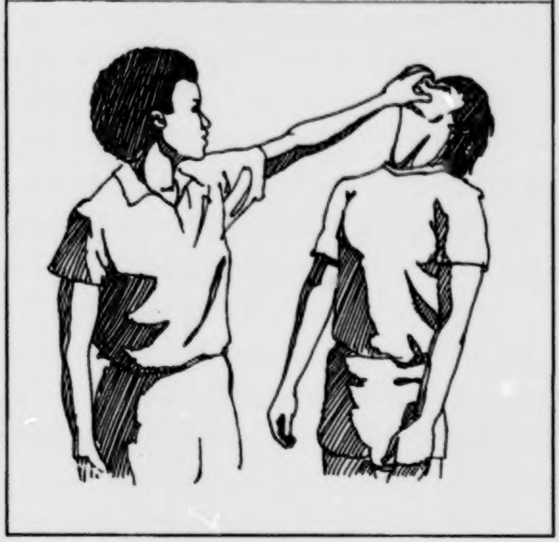


used primarily on soft body parts of the opponent. If bony areas are hit, there is a risk of breaking a bone or bones in the hand. A backhand motion is another way the fist can be used. This is a particularly good way to strike the face of an attacker.

Finger Extension

Extending the fingers on the hand makes a good fingertip jab weapon. Poke an eye forcefully with a two-finger thrust. This should cause at least temporary blindness and extreme pain. This type of blow is primarily successful when used on an eye, but it can also be used when striking the groin or solar plexus.

Figure 7. Heel of Hand Blow



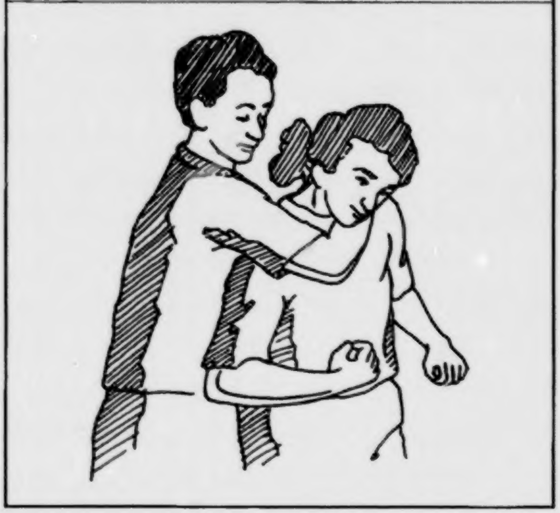
Heel of Hand

The heel of the hand is one of the best weapons in a student's defensive arsenal. Smash the heel of the hand under the attacker's nose and attempt to drive the nose bone into the head. A strong blow can cause unconsciousness. An alternate point of attack is the chin.

Elbow

The elbow is an exceptionally good defensive weapon. It can be used to drive into the solar plexus when grabbed from behind. Students should also be cognizant that they can use the elbow as a weapon when striking many of their attacker's vulnerable areas, particularly those on the head if they are within reach of the elbow.

Figure 8. Elbow Blow



Head

The head can be used effectively for delivering blows to an attacker, whether held in a front or rear bear hug or if a hand is not free to deliver a blow. Either the front or back of the head can be used as a battering ram against the nose, preferably, or other parts of the attacker's face.

Front Kick

Self-defense situations call for different types of kicks. One of the first kicks to learn is the front kick. This is a fast, short kick and is sometimes called a snap kick. The toe, if protected with a shoe, or the ball of the foot is used. The kick is aimed at the shin or knee and a short, powerful kick is made. Quickness is of prime importance so that the attacker cannot grab the foot or step out of range. The groin can also be kicked by using the instep when making a front kick.

Figure 9. Head Butts–Front & Back

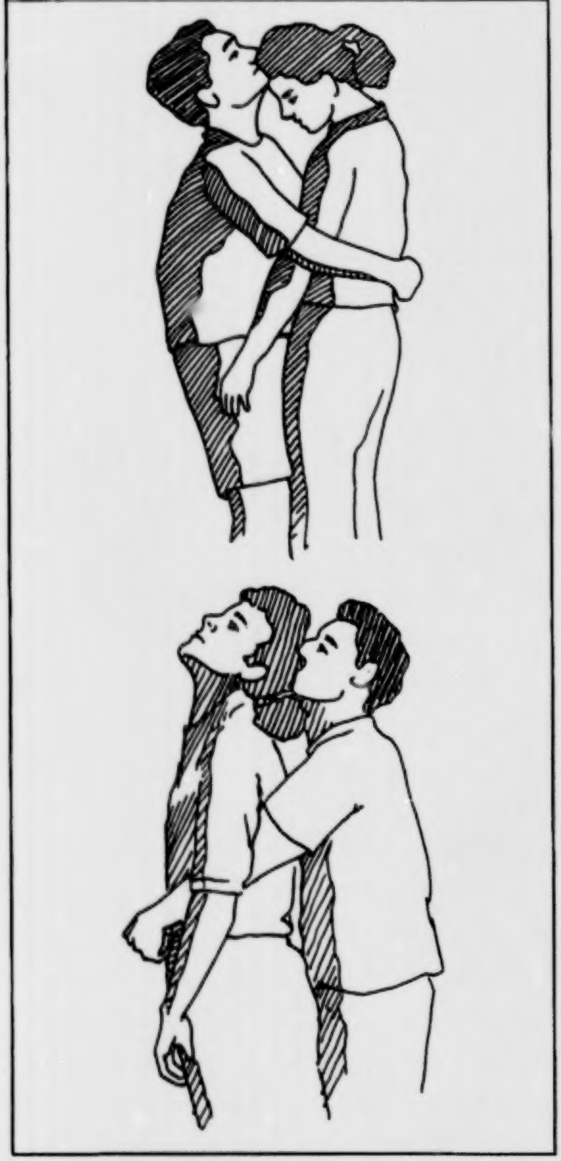


Figure 10. Front Kick

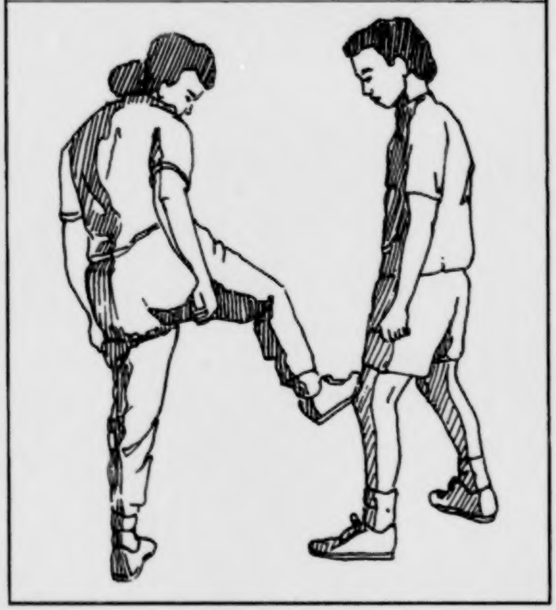
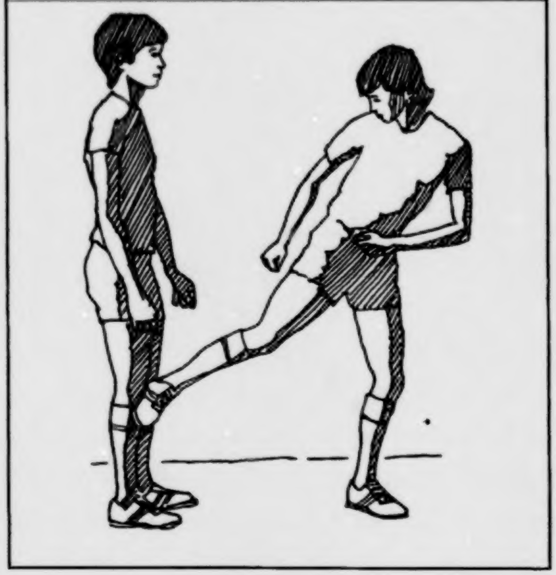


Figure 11. Side Kick



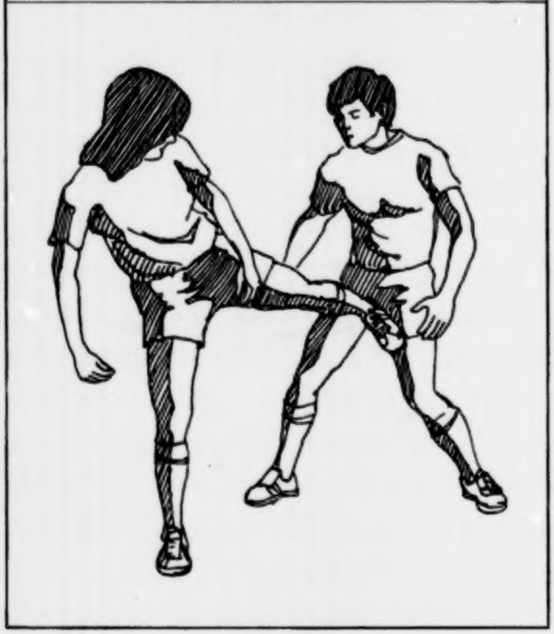
Side Kick

The side kick is made by quickly turning sideways and driving the heel or the side of the foot into the knee or shin of the assailant. All kicks must be fast, concise movements. On this kick, the knee of the kicking leg is driven to the body as the side turn is made, and the leg is vigorously extended to fire the heel or side of the foot toward the attacker's knee or shin.

Heel Kick

The heel kick should be practiced to strike an attacker who makes a surprise attack from behind. The leg is driven straight into the groin, knee, or shin. Contact is made with the heel. Again, action must be swift so the leg is not grabbed. The kick must be carefully timed to be used either when breaking away from an attacker or stopping an assailant's charge from behind.

Figure 12. Heel Kick to the Groin

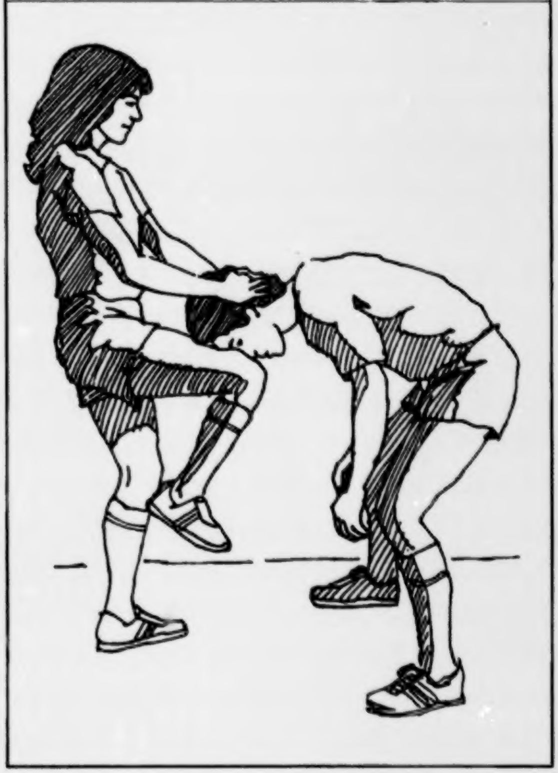


Knee Kicks

The knee kick is another effective self-defense tool. It is used when facing and in close contact with an attacker. A gap should be created between the victim and his/her attacker. Drive the knee sharply to the groin area. There will usually be room to use the knee kick because most attackers will be using their arms to try to control the arms and upper body. It may be necessary to force the hips away to have enough room to use the knee.

If the assailant is bent down or the victim is able to deliver a blow to the back of the head to put the attacker's face within knee range, a vigorous knee kick to the face can abruptly stop the attack. Attempt to drive down on the head at the same time that the knee is being kicked upward. This will increase the power of the blow and will prevent the head from being pulled out of range of the knee.

Figure 13. Knee Kick to Head



Heel Smash

This technique can be used when an assailant is either in front or behind. Smash the heel down vigorously on the top of the instep. The sole of the foot can also be used, but it is not as effective. Another good technique is to turn the foot and scrape down the shin prior to smashing the instep.

Caution

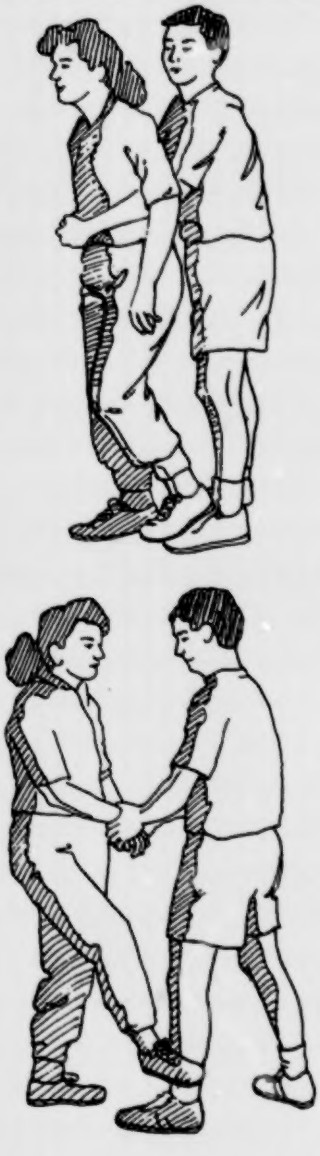
All blows and kicks should be practiced on dummies, padded walls, pillows, or some other soft surface. Full force should never be used against a hard surface, or an injury may occur. Before using dummies or pads, develop correct body position and balance and then

work on speed of execution without any resistance. Never practice these blows on a partner.

Points of Emphasis

1. Always have a target for the blows.
2. Hit fast and hard to the targeted areas of your assailant.
3. Use full force.
4. Always protect your own body when delivering a blow.
5. Return to a good defensive position immediately after delivering a blow.
6. Remember that joints are good attack points.
7. Practice developing a mental picture of an assailant's vulnerable areas for the various blows and kicks.

Figure 14. Heel Smash and Shin Scrape



Falling

When a victim experiences a mugging or some other type of an assault, being knocked down is a common part of the experience. It is for this reason that it is important all students learn how to fall properly. This skill will reduce their chances of being injured when falling and therefore being unable to defend themselves. Just as importantly, being able to fall properly will minimize the advantage of the attacker because students will know how to maintain body control and recover rapidly to a defensive position. Also, being thrown to the ground will not cause them to panic, because they will have experienced the feeling before.

Students must be able to execute the forward, backward, shoulder, and forward dive rolls before practicing falls. Students should be able to perform the rolls competently before starting to learn the falls. It is also good to practice rolls as part of the warm-up before each class.

Always practice falling on thick mats to protect from injury and to give confidence when learning falls. Develop proper form by practicing each fall slowly and then speed up as proper technique is learned. Remember that a fall should not be broken by reaching out with the hand. The objective should be to spread the impact of falling over a larger surface of the body and to develop the ability to relax the body rather than stiffening it.

Side Fall

The side fall is a frequently used fall. It is an effective means of avoiding injury when thrown to the ground or floor. A good way to learn this fall is to start in a squatting position with one leg crossed in front of the other. The forward leg is moved forward and the arm on the falling side brought up in the air as balance is lost. When landing, distribute the force of the fall from the foot to the shoulder and slap the mat with the palm of the hand to break the fall. The arm should be

extended and the fingers slightly spread. Emphasize that the head should be kept off the mat and slap the mat vigorously. After the side roll is mastered from a squat, gradually start farther from the mat until you are capable of falling from a standing position. Then practice rolling to the stomach by bringing the bent leg over the straightened leg. Use this maneuver to move away from an opponent and come to the feet.

Figure 16 illustrates the side fall technique from the feet. Standing with the weight evenly distributed, kick the foot across the body and fall to the side. The right arm and leg are raised as the right buttock hits the mat; roll back to the shoulder and slap the mat with the right hand.

The head stays off the mat at all times, and the legs should be raised when the fall is completed.

Front Fall

Learn the front fall by beginning in a kneeling position on the mat. As the body falls, slap the mat with both hands slightly cupped. The force of the fall is absorbed with the hands and forearms. Keep the hands and forearms straight.

When the front fall can be performed from the knees without jarring the body, move to a standing position. Fall forward smoothly from a relaxed position and make contact with the mat simultaneously with the hands and forearms. Keep the body straight when falling forward; only the hands, forearms, and toes should be in contact with the mat when the fall is finished. Do not hit the mat with bent wrists.

Back Fall

The back fall is learned by beginning in a sitting posi-

Figure 15. Side Fall from Squat

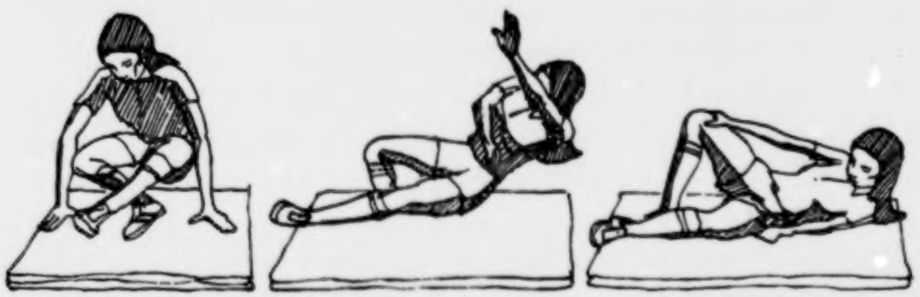


Figure 16. Side Fall from Feet

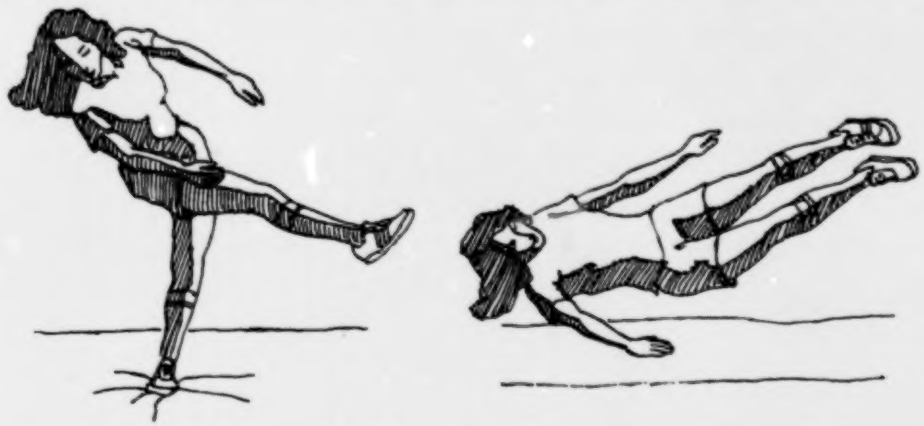
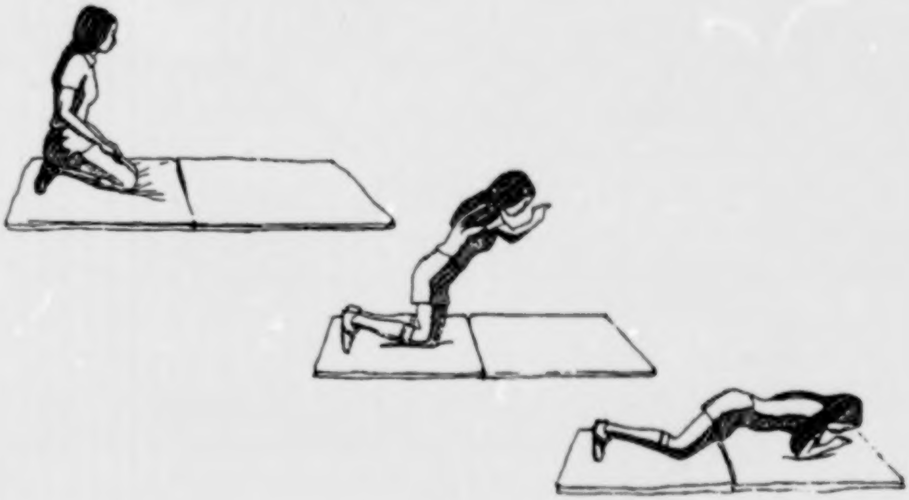


Figure 17. Front Fall from Knees



tion. Have the back slightly rounded and the head tilted forward. Round the back and roll back with an easy motion as the arms and legs are raised. Slap the extended forearms and hands to the mat as the upper back hits the mat. As with other falls, keep the head from hitting the mat.

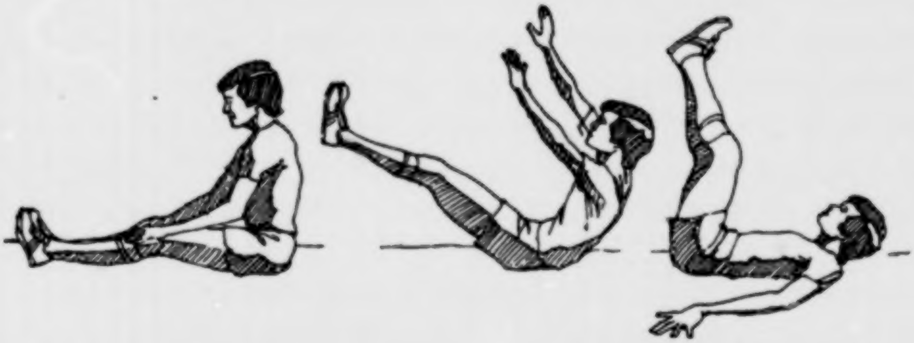
The next step is to begin the back fall from a squatting position. Roll onto the back while tucking in the buttocks to avoid shock to the back. The movement after making contact with the mat with the buttocks is the same as when starting from a sitting position. Finish by slapping the hands and forearms against the mat and keeping the chin tucked to the chest. The legs should be raised in the air when finished.

Breaking Holds

Sometimes the natural reaction is not the reaction that will allow one to break a hold.

Analyze each technique to see how to get a mechanical advantage even if the attacker is bigger and stronger.

Figure 18. Back Fall from Sitting Position



Wrist Release

The natural reaction when someone grabs the wrist is to pull back. This is exactly what the attacker wants the victim to do. The appropriate action is to drop the elbow forcefully and use a twisting action to exert force against the attacker's thumb.

The same action is used when the assailant has a hand on each of the wrists. Each wrist should be twisted toward the attacker's thumb. Immediately move to a good defensive stance or attack if the assailant is off-balance or in a position of vulnerability to a kick or hand blow.

Two-Hand Wrist Release

If an attacker grabs one wrist with both hands, release can be gained by grasping the fist of the grasped arm with a free hand and pulling it sharply upward while lowering the elbow of the held arm. Lower the body weight to give additional leverage and maintain a balanced position when the arm is freed.

Another release technique, when one of the wrists is controlled, is to deliver a blow to the attacker's throat, mouth, nose, or eyes with the free hand. Use the extended hand position and expend all force possible to slash into the attacker with a chopping action. Repeat the blow rapidly if the attacker remains in a vulnerable position by maintaining hold of the wrist.

Figure 19. Single & Double Wrist Release

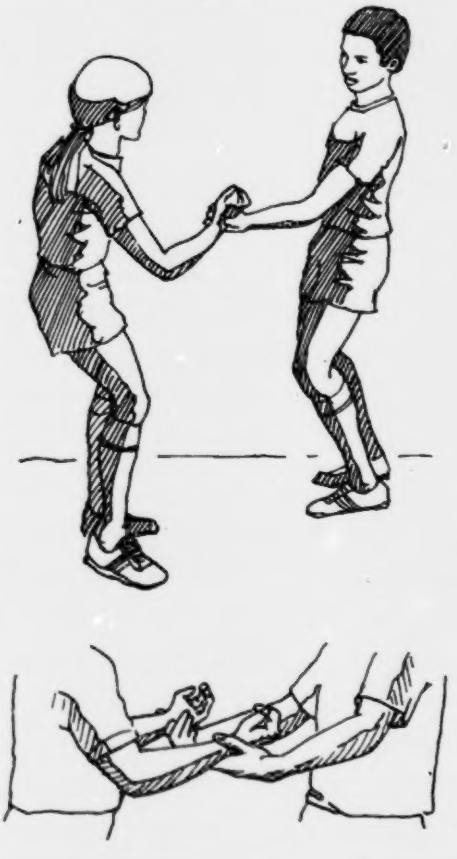


Figure 20. Two-Hand Release

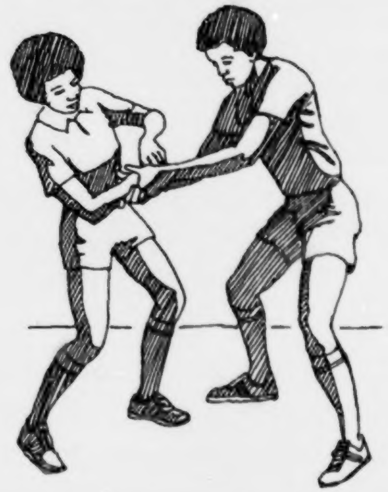
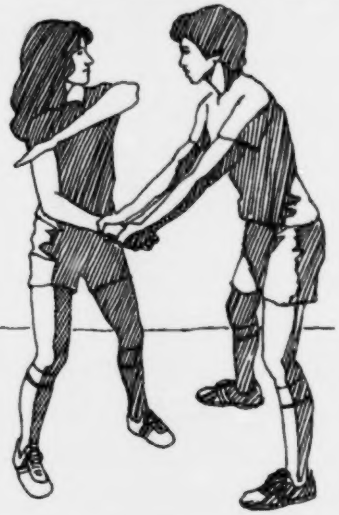


Figure 21. Chop Release for Two-hand Wrist Grab



Bear Hug

Learn several different ways to break free from a bear hug. The bear hug prevents the victim from moving away from the attacker and limits the blows that can be used to overcome the attacker. It is therefore important to know how to break free from a bear hug.

Several techniques were covered in the section on kicks. The shin can be kicked with the toe or scraped with the side of the shoe. The groin can be kicked with the knee. One can also lean back and give a hand chop to the throat or a vigorous smash to the chin with the heel of the hand.

If the bear hug is from behind, kicks and blows are again effective. A kick to the shin, stomping on the instep, or stepping to the side and striking the groin with the hand are all effective methods. Grasping a finger and pulling back with all possible force and biting a hand or arm across the face should also be considered.

Two other techniques that can be used against the bear hug are to butt forcefully into the opponent's face and pinch tightly on the inside of the thigh.

Front Choke Hold with Two Hands

There are some important principles to emphasize when learning defenses against choke holds. If the attacker grabs the neck with both hands and begins choking, react rapidly. The first action to use to release the grip is to clasp the hands and drive the arms up between the attacker's arms. This will release the grip. Immediately go on the offensive by smashing the hands over the bridge of the attacker's nose or use another striking or kicking movement to disable the attacker.

Another technique that can be used is to raise the arms above the head outside the attacker's arms, twist rapidly, and turn away to apply pressure on the attacker's wrists. This will release the neck grasp and provide an opening for a counterattack or an escape maneuver if the attacker is momentarily off-balance.

Rear Choke Hold with Two Hands

The double arm twist described in the previous paragraph also works effectively to counter a rear choke hold. As soon as you turn and free yourself, look for an escape route or strike a vulnerable part of the attacker's body.

Rear Choke with Two Arms

When the throat is encircled from behind, be prepared to act rapidly. Tuck the chin into the chest to take pressure off the throat. Next, grasp the assailant's right

Figure 22. Bear Hug Defenses

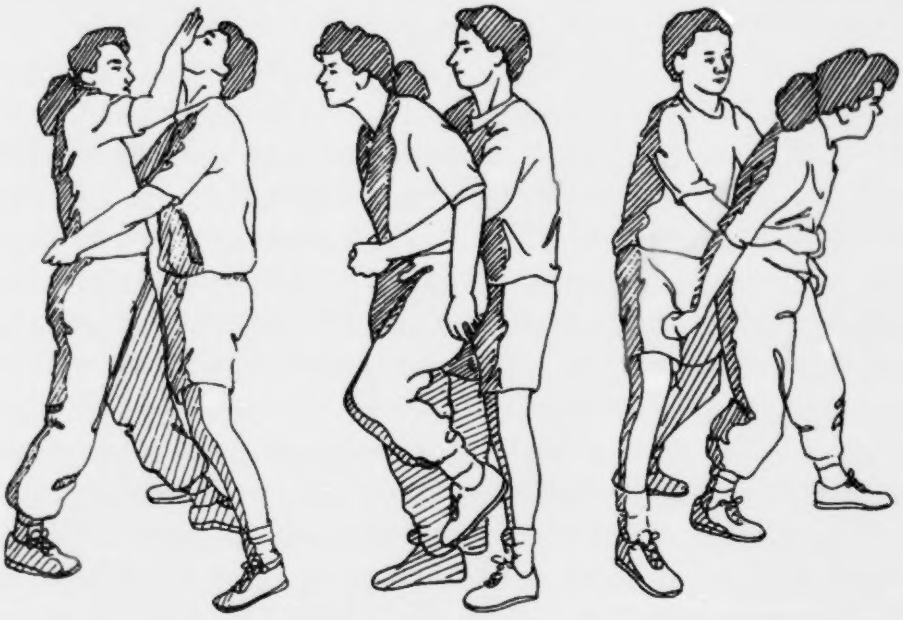
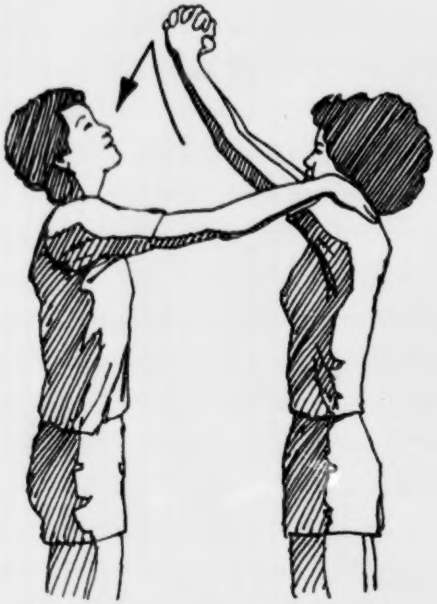


Figure 23. Front Choke Hold Release Action



elbow with the right hand as shown in Figure 24. The left hand grasps the attacker's right wrist. Lift on the elbow, push down on the wrist, and duck under the arm. Keep control of the arm if possible and pull it behind the attacker's body where it can be twisted or jerked upward to control the assailant. See also the flying mare throw.

Special Defense Against a Male Attacker

A special technique that can be used against a male attacker is the testicle jerk. This is a technique to be used if threatened with physical violence. The procedure is to grab tightly around the top of the testicles, twist vigorously, squeeze, and jerk.

Throws

Throws should not be considered a first line of defense. To throw someone, the victim must be close to that person. This leaves the victim vulnerable to blows, choke holds, and kicks. It is best to use a defensive tactic that will keep the victim out of range of the assailant. Throws require skill, and an attacker can sometimes neutralize the skill with strength and brute force. Learn throws only after learning how to fall properly.

It is important to learn some basic throws because there will be times when a victim finds himself/herself in a position where a throw is the best, and perhaps only, defensive technique.

Throws are also good to practice because the victim learns to fall correctly and recover rapidly after being thrown. In many rough and tumble fights, throws to the ground will be used, and it is good to know how to react.

Hip Throw

Practice assuming the correct position before attempting this throw. It is used when the victim is close to the attacker. The victim should grasp the attacker's right arm with the left hand and slide the right arm around the waist. Simultaneously place the right foot next to the inside of the attacker's right foot. The victim then pivots on the right foot and steps back so that the attacker's body will be across the victim's hip. To initiate the throw, the victim bends the knees and then springs up. This will pull the attacker off the mat. The victim completes the throw by bringing the opponent forward over the victim's hip and follows to the mat.

Figure 24. Rear Choke Lift and Duck Release

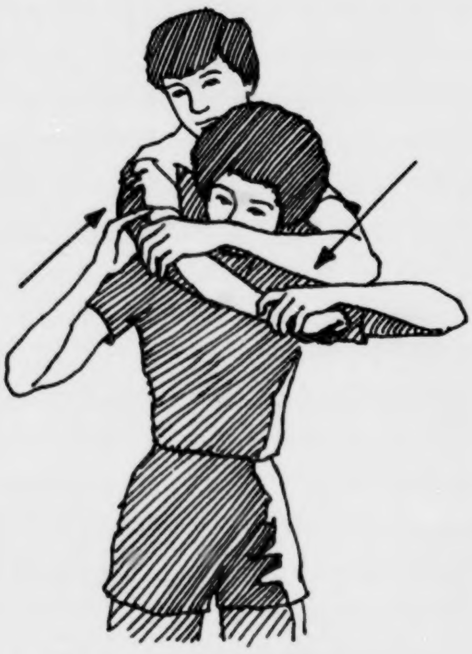


Figure 25. Hip Throw

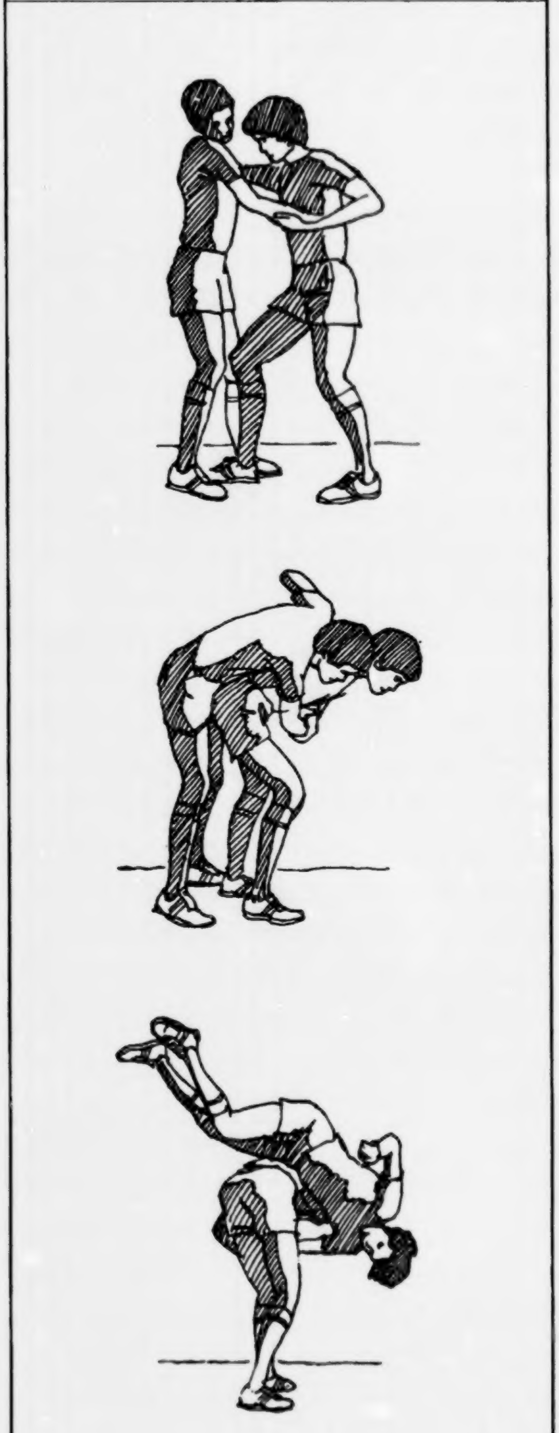
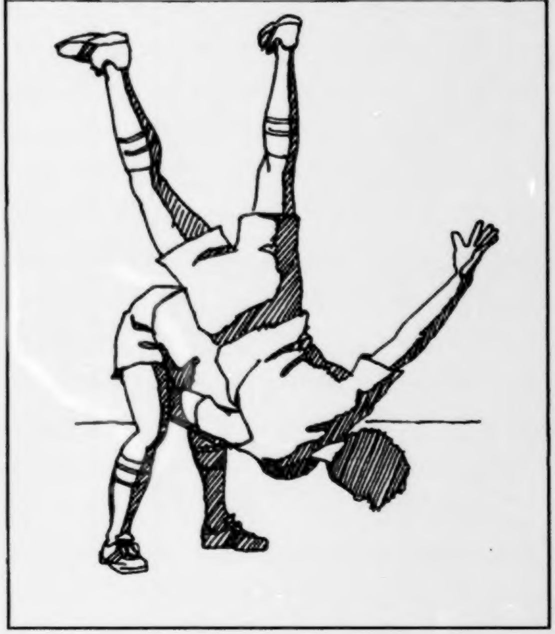


Figure 26. Flying Mare Being Executed



Flying Mare

This is a technique to use when grabbed from the rear with a choke hold. The technique to use is as follows.

The victim should reach both hands up and hold as high as possible on the attacker's upper arm. Keep good balance with a low center of gravity. With the attacker's weight on the victim, an explosive forward and downward motion of the head should be used to bring the assailant over the victim's head and onto the mat. A vigorous downward motion should be used while the arm is pulled hard.

Using the flying mare will free the victim and provide an opportunity to escape or use one of the disabling techniques once the opponent is on the ground.

When practicing this throw, be sure the victim keeps control of the attacker's arm and helps the attacker land safely. Practice initially with a thick mat until both victim and attacker are under control from start to finish of the throw.

Back Trip Throw

Another situation that it is good to be prepared to handle is when the attacker's arms are around the waist. As with all moves, immediate action is important. The first movement should be forward to destroy the attacker's balance. It is important to maintain a position above the attacker if at all possible. Shift the hips quickly to the side; step the inside leg behind both

legs of the attacker; push vigorously at the shoulders while simultaneously kicking the attacker's leg upward.

This will drop the attacker to the ground with sufficient force to provide the victim with an opening to attack with a kick or blow.

Advanced Skills

The front and rear wrist breakers are not difficult to use in the practice situation, but they should be used primarily by people experienced with self-defense skills in an attack situation. In spite of this, they are good to include in a secondary school self-defense unit because they demonstrate how pressure can be used to gain a mechanical advantage and how a person can use self-defense skills to stop a larger and stronger antagonist. They are also good to learn so students will experience pain when pressure is exerted properly and will learn the importance of going with the pressure to prevent injury during practice.

Front Wrist Breaker

Grasp the assailant's right hand with your left (or the assailant's left hand with your right). Place your thumb on the center of the knuckles and grab the palm of the hand near the thumb with the fingers. Pull the attacker's hand to the inside so that the fingers point straight up. While turning the hand, place your right thumb on the knuckles next to the attacker's left thumb and grab the palm of the hand near the little finger with the fingers of your right hand.

Note that the fingers meet in the palm of the assailant's hand and that the little fingers are near the wrist. When the hands are in position, immediately drive the attacker's fingers straight up and push hard with your thumbs to cock the wrist as far as it will go.

Keep the wrist cocked and turn the palm of the attacker's hand to the outside. Keep pressure on the wrist as your body weight is shifted forward; pivot your hips toward the attacker's free arm and drop him/her to the ground with the pressure being placed on the wrist.

Rear Wrist Breaker

The rear wrist breaker technique has many similarities to the front wrist breaker. Reach across the attacker and grasp his/her right hand with your right hand or his/her left hand with your left hand. The thumb is again placed in the center of the knuckles, and the little finger side of the hand is grasped with your fingers. The attacker's hand is then twisted to the outside, and the wrist is cocked.

Figure 27. Hand Position for Front Wrist Breaker

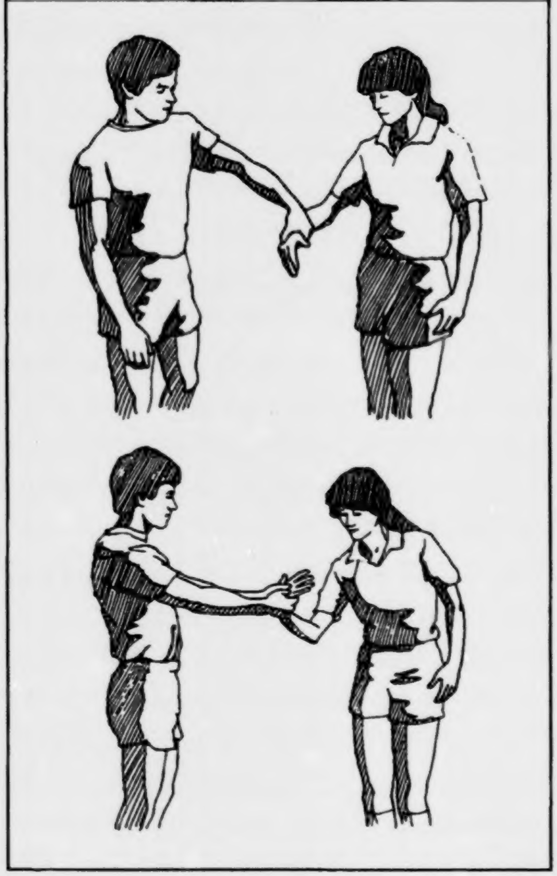


Figure 28. Wrist Cocked

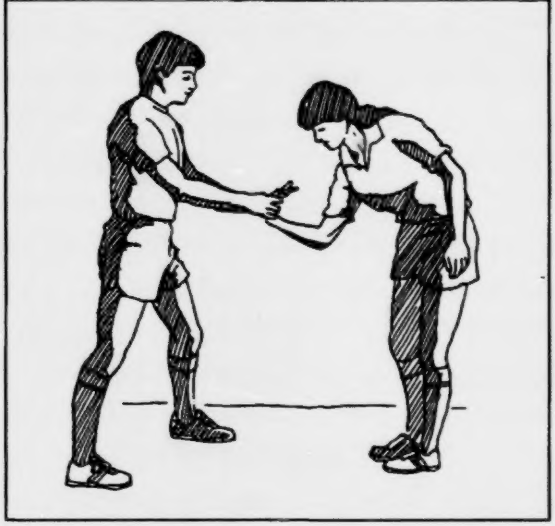


Figure 29. Finish of Front Wrist Break

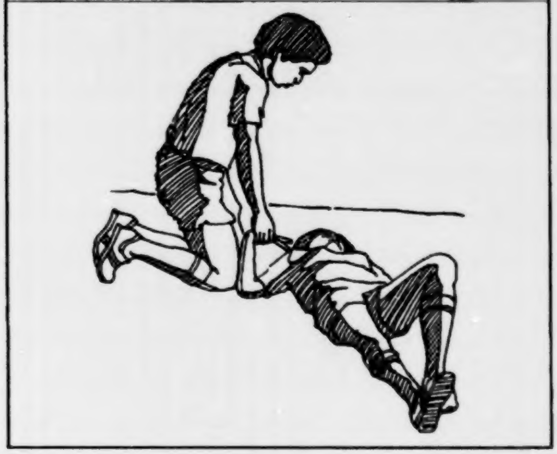


Figure 30. Hand Postion for Rear Wrist Break

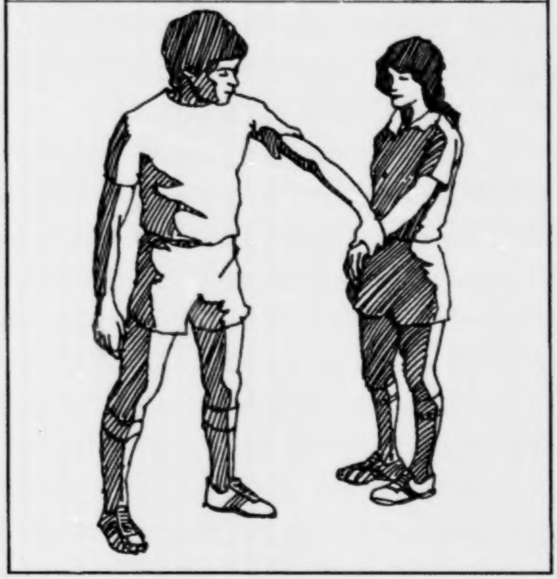
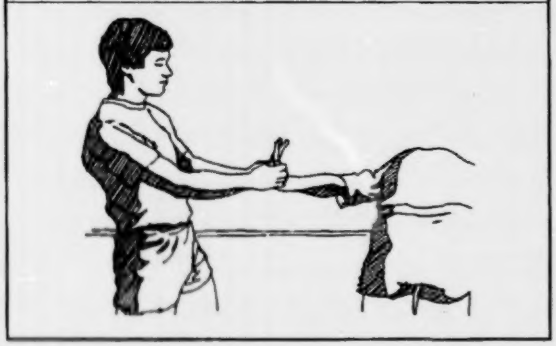


Figure 31. Rear Wrist Break



The other hand is then placed in a similar position with your thumb on the knuckles and your fingers clamped on the thumb side of the palm. Place the second hand in position as soon as possible. Turn the attacker's hand to the outside of his/her body; then move your body to a rear position. Point the fingers of the attacker straight up by putting pressure with the thumbs and pulling in vigorously with the fingers. This is a very painful hold. The attacker can be driven to the ground; control can be maintained by extending your arms and increasing the leverage being placed on the wrist. The correct leverage is being applied if the knuckles are being driven toward the elbow.

There are many other more advanced skills that can be taught after students develop the ability to use the skills described in this chapter. Various types of advanced blocks, trips, throws, and holds will provide a continuing challenge.

Once students know the basic self-defense techniques, stage different types of danger situations and have students react by using the best self-defense skill or skills for each situation. They should continue to practice the skills they have learned until they become automatic reactions to simulated attacks.

Throughout the course, the teacher should continue to emphasize that self-defense techniques are used only when absolutely necessary and that every measure must be used to avoid physical encounters. Blows, kicks, and other types of force are used only when such action is clearly indicated because personal safety is threatened or life is endangered.

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CHAPTER 17

Soccer

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Introduction

Welcome to the game of soccer! Soccer is the national game of over 150 countries and is unquestionably the most popular sport in the world. It is truly THE international game. Although soccer has not yet achieved the status in the United States that it enjoys in other countries, its popularity is growing rapidly. In fact, soccer is the fastest growing team sport in our country, with nearly three million youth soccer players. In addition, there are currently over 1,200 men's and women's collegiate soccer teams, and most high schools now field soccer teams for both boys and girls.

There are several reasons for the game's tremendous growth. First, soccer is an inexpensive sport to play, partially because almost no protective equipment is necessary. All you need is a soccer ball, socks, soccer shoes or other appropriate footwear, shin guards, shorts, shirt, mouthpiece, and field markers such as cones or flags and you are ready to play! Second, a player's size is unimportant to success. Endurance, speed, agility, coordination, and a desire to learn are far more important factors than size for developing soccer skills. In fact, some of the world's greatest soccer players are shorter than average. Third, soccer's tactics and strategies are very similar to those of such familiar sports as basketball, field hockey, and ice hockey. Therefore, you can quickly "get the feel of the game" and can begin to play both modified and regulation soccer games while you acquire the basic skills of the game. Fourth, soccer is a relatively safe game, especially when you follow a few basic safety rules. There is a low incidence of body contact, and most of the injuries sustained during play are typical bumps and bruises.

Soccer is a fast-moving game played by two teams of 11 players (backs, midfielders, forwards, and one goalkeeper) on a lined, rectangular field with goals at each end of the field. The object of the game is for teams to score points (goals) by kicking or heading the ball into the opponent's goal. Therefore, soccer is different from other sports in that the primary way of receiving and striking the ball is with the feet instead of the hands (the goalkeeper is the exception). Ball control is the very essence of soccer. How far players kick the ball isn't nearly as important as how accurately the ball can be directed and how quickly it can be brought under control.

The true origins of soccer are uncertain. However, there is evidence that the ancient Greeks were responsible for originating the game and that the Roman legions brought it to England around A.D. 43. It was there that the game was refined and gradually evolved into the game we now know. More specifically, in 1863 the English Football Association was formed and the laws (rules) of soccer were unified for the first time. Soccer was originally called football, but when the organization later shortened its name ("Assoc"), the word "soccer" appeared. However, in all countries but the United States, soccer is still called "football."

The Federation Internationale de Football Association (FIFA) was founded in 1904 and established a standard set of rules for all nations. The FIFA is soccer's governing body and also conducts the World Cup every four years. The World Cup, which is the most prestigious soccer tournament in the world, began in 1930. The first Women's World Cup was played in Beijing, China, in 1992 and the United States hosted its first World Cup in 1994. Soccer was first played as

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an Olympic sport in 1930. In 1996, the United States women's soccer team won the gold medal, and the men's team was very competitive against the world's best teams when the Games were played in Atlanta.

The recent success of the U.S. national teams has fueled our nation's interest in soccer. For example, a professional league (Major League Soccer – MLS) was started in 1996 and has sustained itself quite well. Its games are nationally televised, and attendance has been very impressive. Watching these games, either in person or on television, is an excellent way for you to see the skills and tactics of soccer.

The United States Soccer Federation (USSF), founded in 1913, is the internationally recognized national association for soccer in the United States. The USSF is responsible for conducting all national competitions in this country, serves as a source of information about soccer throughout the country, and offers coaching certifications and clinics. The United States Youth Soccer Association (USYSA) was founded in 1974 and is affiliated with the USSF. The USYSA is responsible for promoting the growth of youth soccer players (under 19) throughout the United States.

As you read the rest of this chapter, you will see that soccer is a game that can and should be modified to accommodate the number of players on each team as well as their ages and skill levels. Soccer is meant to be an active game with only a few basic rules and relatively simple tactics. The field is large enough so the ball does not go out of play very often (a regulation soccer field is about 18 times larger than a basketball court!), and the clock runs continuously, except for injuries and halftime, so there is plenty of action. In addition, the player positions are not static; they are interchangeable. Last, the transition from offense to defense is constant because ball possession changes rapidly.

There are many benefits to playing soccer. Among them are that soccer promotes cardiovascular fitness, coordination, and balance. In addition, for teams to be successful, players must learn and demonstrate teamwork and cooperation. You will also become increasingly confident as you see your skill level improve. Next, soccer is a game that can be played throughout your life on a recreational basis once you acquire the basic skills. Last, and perhaps most important, soccer is *fun* because anyone can play and experience success!

Terminology

Angle of Possibility. Angle formed by imaginary lines drawn from the ball to each goal post within which the ball must travel in order to enter the goal (see Diagram 4)

Attacking Team. Team in possession of the ball.

Block Tackle. Attempting to dislodge the ball from the attacker by blocking it with the inside of the foot.

Centerline. A line connecting the two sidelines at midfield, dividing the field into two equal parts.

Clear. A defensive play moving the ball away from scoring range.

Containment. Keeping the attack in the opponent's defensive area.

Corner Kick. A direct free kick taken by the offensive team from within a 1-yard arc at the corner of the field.

Dangerous Play. Any play in which players' actions endanger the safety of themselves or opponents.

Defending Team. Team trying to gain possession of the ball.

Direct Free Kick. An unobstructed place kick that may go directly into the goal.

Dribble. The act of running with the ball under control using a series of pushes or taps with the feet.

Drop Ball. Method of initiating play after an injury or when a double personal foul has been called.

Fake (Feint). Act of deception to gain advantage of the opponent.

Far Post. The goalpost farthest from the ball.

First Time Kick (One Touch). Kicking the ball without trapping it first.

Give and Go (Wall Pass). Passing the ball to a teammate and quickly running to an open area to receive a return pass; also called triangulation.

Goal. When the ball passes completely across the opponent's goal line between the goalposts and beneath the crossbar.

Goal Area. A marked area immediately in front of the goal that is 20 yards wide and 6 yards deep.

Goal Kick. An indirect free kick taken by the defense after the ball has passed over the goal line.

Goal Line (End Line). The boundary line marking the end of the field.

Half Volley Kick. Kicking the ball the instant it rebounds from the ground.

Head. To play the ball with the head.

Indirect Free Kick. An unobstructed place kick that must be touched by another player before a goal can be scored.

Inside of Foot. Area between the base of the big toe and the heel and below the ankle.

Instep. The inside portion of the foot from the toes to the ankle.

Juggling. Keeping the ball in the air continuously by using various parts of the body except the hands. Juggling is an excellent training technique used to develop ball control skills.

Kickoff. Place kick taken from the center of the field at the beginning of each period and after each goal.

Marking. Defensive position in which the offensive player's moves are contested.

Near Post. The goalpost closest to the ball.

Offside. A player is offside if the player is between the opponent's goal line and the ball at the moment the ball is played unless one of the following occurs: the player is in the defensive half of the field; at least two opponents (including the goalkeeper) are nearer their own goal line than the player is; or the ball is received directly from a corner kick, goal kick, throw-in, or drop-ball situation. The penalty for being offside is an indirect free kick.

Pass. To kick or head the ball to a teammate.

Penalty Area. A marked area in front of the goal that is 44 yards wide and 18 yards deep.

Penalty Kick. A direct free kick taken by the offensive team in response to a foul occurring in the penalty area.

Player Positions. (See Diagram 3). The player positions are traditionally described in the following manner:

- *Goalkeeper* – Responsible for defending the goal. Can use hands in the penalty area and can punt, roll, or throw the ball after a save.
- *Defenders* (backs or fullbacks) – Players who provide the last line of defense; their primary responsibility is to thwart attacks on goal. Should be good tacklers. The sweeper is the last player in the line of defense before the goalkeeper.
- *Midfielders* (halfbacks) – Responsible for supporting forwards on attack and putting pressure on the defensive team. Also assist backs on defense. Midfielders must be competent in all skills and possess great endurance to link the defense to the attack.
- *Forwards* (strikers) – Responsible for scoring goals and sustaining attack. Forwards should be able to dribble well and shoot with either foot.
- (It should be understood that there a are variety of strategies that will alter some of these traditional responsibilities).

Poke Tackle. A tackle where a player reaches in and uses the toes to poke the ball away from an opponent.

Save. To prevent the ball from entering the goal.

Shielding. When dribbling, keeping the body between the ball and the opponent.

Slide Tackle. A tackle where a player slides and kicks the ball away from an opponent.

Stopper. A central defender whose primary responsibility is to stop the opponent's center forward.

Striking. Kicking or otherwise contacting the ball.

Switch. When a player assumes a field position that is generally occupied by another player. The players simply reverse their general areas of responsibilities.

Tackle. Dislodging the ball from an opponent by using the feet.

Throw-In. Method of initiating play after the opponent has sent the ball over the touchline (sideline). Both feet must remain on the ground, and the thrown ball must pass directly overhead, across the sideline, and into the field of play.

Trap. A method of bringing the ball under a player's control.

Volley Kick. Kicking the ball while it is in the air.

Weak Foot or Side. Foot or side with which a player is weaker or less proficient.

Fitness Requirements

Soccer is among the most physically demanding of all sports. When you consider the very large size of an official soccer field and the fact that the clock runs continuously, it shouldn't be surprising to learn that during a regulation (90-minute) soccer game, most players run 4-6 miles. In addition, throughout the game, players generally make 180-200 sprints or "runs" up and down the field. Thus, endurance training is essential. Players also need to develop agility, flexibility, and muscular strength and endurance if they are going to reach their potential.

Whenever possible, conditioning exercises should be incorporated into drills and warm-ups so that players improve their skill level and conditioning simultaneously. Therefore, players will, to some degree, "play themselves into shape" during the drills and games.

Nevertheless, you will still need to devote a portion of your time and energy to activities whose exclusive focus is physical conditioning.

Endurance Training

Endurance training for soccer has two components: continuous running at a steady pace (aerobic), and running or sprinting at a pace that cannot be sustained (anaerobic). Aerobic training should be developed first because it provides the foundation for anaerobic conditioning. A good strategy to test your aerobic conditioning level is to see if you can run continuously for 10-15 minutes at a comfortable pace. Once you are able to do this, start adding a few bursts of speed to each workout because these simulate the demands you will encounter in game conditions. With each additional workout, you should increase the number of sprints in your workouts.

Other methods of building anaerobic conditioning include interval training and fartlek. Interval training consists of alternating sprints of various distances and intensities with jogging and resting. For example, you might sprint 50 yards, jog 50 yards, and then rest for 30 seconds. As your conditioning improves, you should increase the number of repetitions. Relay races and shuttle runs (preferably while dribbling a ball) are modifications of interval training and should be used frequently during practices. Fartlek (which means "speed play" in Swedish) consists of alternating various paces (sprints, steady running, jogging, and walking) for a specific time or distance. Both interval training and fartlek will improve your anaerobic conditioning and are excellent preparation for the rigors of intense soccer games and drills.

Whenever possible, dribble a soccer ball while you work on your endurance training. This will make the activity more interesting and improve your ball control skills.

Warm-Up

A thorough warm-up before each practice is essential. The warm-up exercises will elevate muscle temperature, increase blood flow, and prevent muscular soreness. The exercises will help develop fitness components such as agility (ability to change directions quickly), flexibility (range of motion), and muscular strength and endurance (capacity of a muscle group to continue contracting). Several exercises for each fitness component are listed below.

Agility can be improved by activities that require players to move their body around or over the ball. Several of these activities are listed in Figure 1 (a, b, c). Try to increase the number of repetitions or extend the length of the activity each day.

Flexibility is important in soccer and can be improved by stretching different body parts or moving them through a range of motion. Illustrations of appropriate stretching exercises can be found in the Physical Fitness chapter of this book. Each of the stretches should be done without bouncing and should be held for 20-30 seconds. Figure 2 shows an additional flexibility exercise especially useful in preparing to play soccer. In this exercise, the ball is lifted off the ground. It is slowly brought over the head and held for 5–10 seconds to stretch the lower back and hamstrings.

Muscular strength and endurance are developed by overloading a muscle group. This can be accomplished through exercises that use a person's body weight as resistance. Examples of such exercises are either modified or regular push-ups or squat thrusts (six count) for the upper arms and shoulders and sit-ups (bent knees only), curl-ups or crunches for the abdominal muscles. When doing these exercises, remember to use proper form and to go slowly for best results.

Cooldown

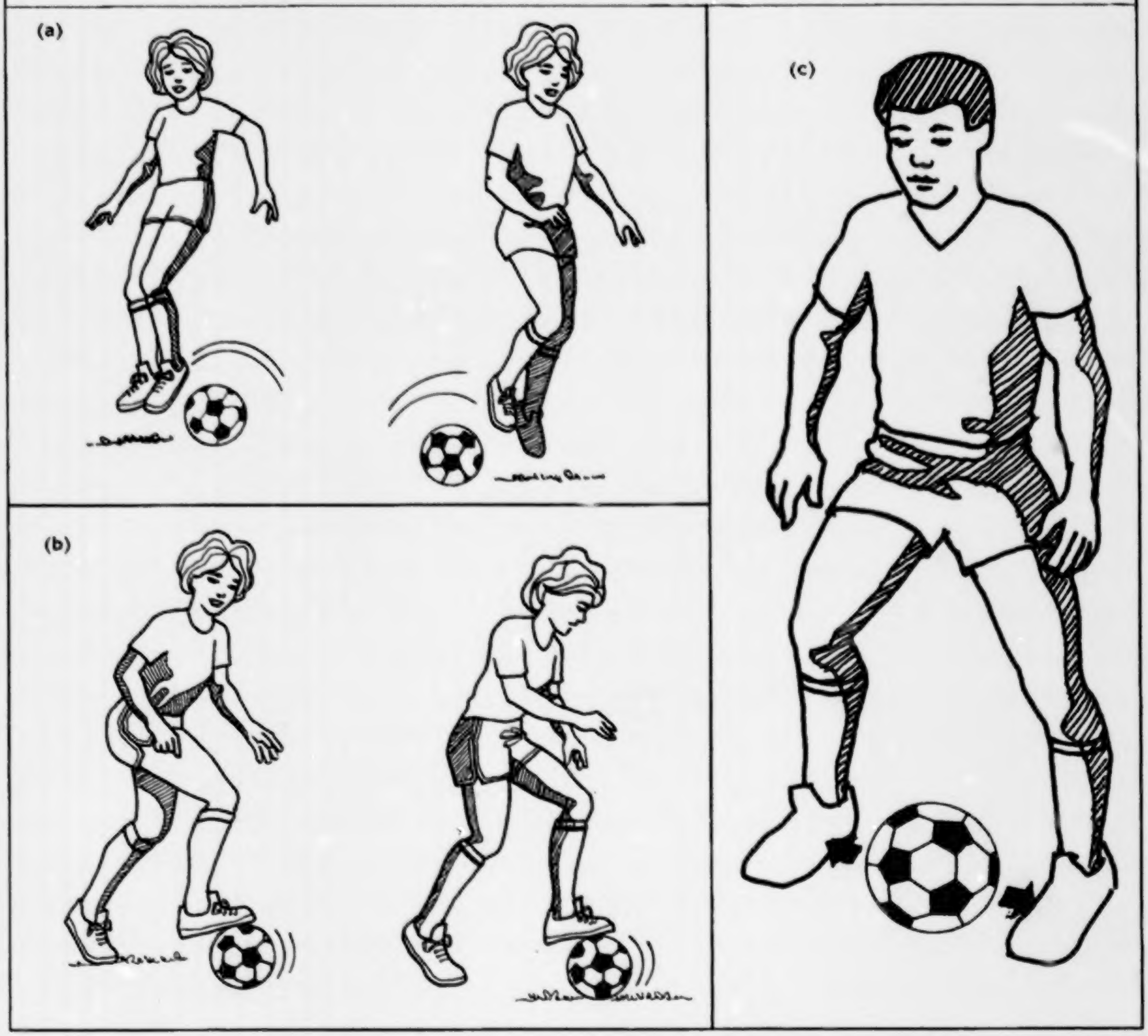
At the end of a vigorous practice, it is a good idea to hasten your body's return to normal. This is best done by slowly jogging for a few minutes and stretching the major muscle groups in order to prevent muscular soreness and cramping.

Soccer Skills

The soccer skills that follow are sequenced in a way that should enable you to learn the basics of the game most efficiently. As you practice each skill, please keep the following points in mind.

1. It is easier to control the ball when it is passed on the ground than through the air. Therefore, passing and trapping ground balls are the most important and commonly used skills in soccer.
2. As you learn each skill, concentrate first on your technique. It is a good idea to touch the part of the body that you will use to either strike or trap the ball. This will enable you to check whether you are making the proper contact. Next, practice each technique *without* the ball. Doing this will give you the "feel" of the skill. Ask your teacher or a partner to observe your technique and tell you whether you are doing the skill properly. Remember, your technique is critical to

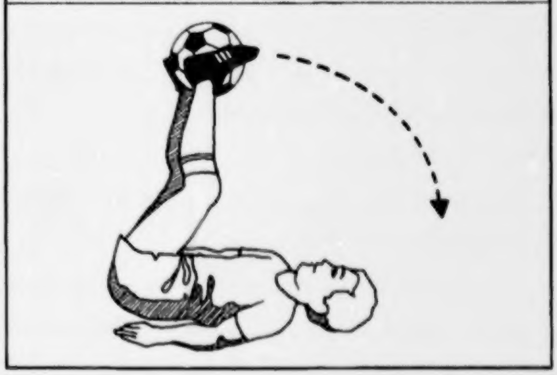
Figure 1. Agility Exercises: (a) rhythmic ball jumping, (b) lightly touching stationary ball while alternating feet, (c) tap ball back and forth with insides of feet



success. You will have success in game situations *only* if you first master the technique for each skill.

3. You should first practice each skill while standing still. However, try to practice the skills while moving as soon as possible. Similarly, at first you will be passing to stationary targets. However, also practice passing the ball to moving targets because this simulates game conditions.
4. Success in soccer largely depends on being able to execute the skills of the game under pressure.

Figure 2. Flexibility Exercise



Therefore, you must learn to trap and pass the ball quickly and be able to use both feet to control and strike the ball. Suggestions for developing this level of proficiency are contained in the Practice for Improvement section.

5. Although you will practice each skill individually, success in game situations is generally based on using the skills in combination with each other and making quick decisions about which skills to use. Suggestions about how to apply the skills to game situations are provided in the Tactics section.

General Suggestions about Trapping (Collecting) Balls

1. Move into the path of the ball. Learn to position yourself directly in front of the oncoming ball by judging how fast the ball is rolling or its trajectory if it is in the air. Do not stand and wait for the ball to come to you! Move to receive the ball.
2. Use the widest or largest body surface to trap the ball. This will increase the chances that the ball will be controlled.
3. Reach out to meet the ball. Once you contact the ball, cushion the force by "giving" with the ball, or "pulling back" the trapping surface.
4. Relax the body as the ball is contacted. Think of trapping as "catching an egg."
5. Try to direct the ball to your feet and immediately control it. The "first touch" is critical. The ball must be brought under control before you can pass or dribble it.

General Suggestions about Striking (Passing or Shooting) Balls

1. The direction and trajectory of the pass are determined by what area of the ball is contacted (Figure 3). If the ball is contacted to the left or right of its vertical axis, it will go to the right or left, respectively. If the ball is contacted at its center, it will go straight ahead. Likewise, if the ball is contacted above its horizontal axis it will stay on the ground. If it is contacted below its center, it will rise.
2. Passing the ball on the ground is best for accuracy. In addition, the widest surface should be used for maximum accuracy. Although experienced players are able to use any part of the foot or body to direct the ball, beginners should concentrate on using the inside of the foot pass for accuracy and the instep kick for power.
3. The nonkicking foot should point toward the intended target. In addition, to keep the ball on the ground, place the nonkicking foot close to the ball with the knee of the kicking foot directly over the ball. To make the ball rise, place the nonkicking foot farther from the ball and lean back.
4. After you decide where to pass the ball, be sure to keep your head down and your eyes on the ball.

Passing and Trapping Ground Balls

The following passes and traps are used in combinations. They form the basis of all ball control skills and should be constantly practiced under different conditions.

Inside of the Foot Pass (Figure 4). The inside of the foot pass is the most accurate pass because it uses the largest surface area of the foot. It is the most commonly used pass and should be used to pass the ball for distances of up to approximately 20 yards.

Performance Cues: (1) Place the nonkicking foot within six inches of the ball and pointed toward the intended target. (2) Turn the kicking foot outward with the inside of the foot toward the ball. (3) Strike the ball with the inside of the foot with the ankle locked. The action is similar to the way a golf ball is hit with a putter. (4) Be sure to contact the top half of the ball to keep the ball on the ground.

Outside of the Foot Pass (Figure 5). The outside of the foot pass can be used to pass the ball while the player is running and doesn't have time to set up for the inside of the foot pass. Therefore, it is a time saver.

Figure 3. Vertical and Horizontal Axis of a Soccer Ball

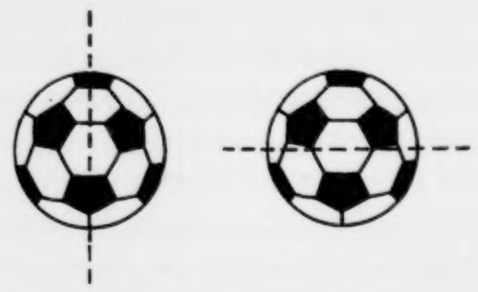


Figure 4. Inside of the Foot Pass

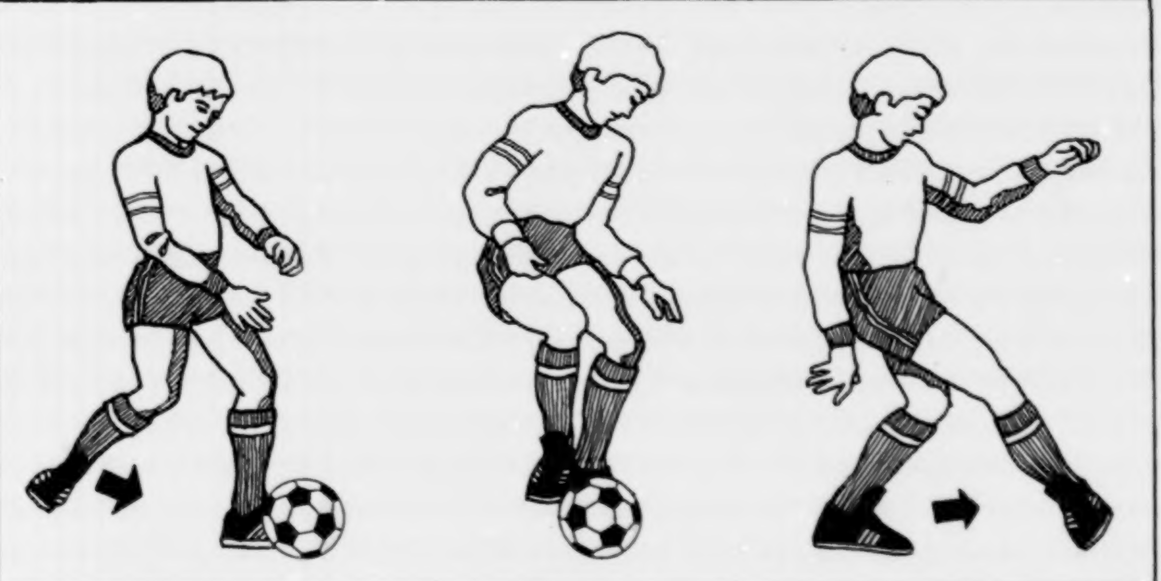
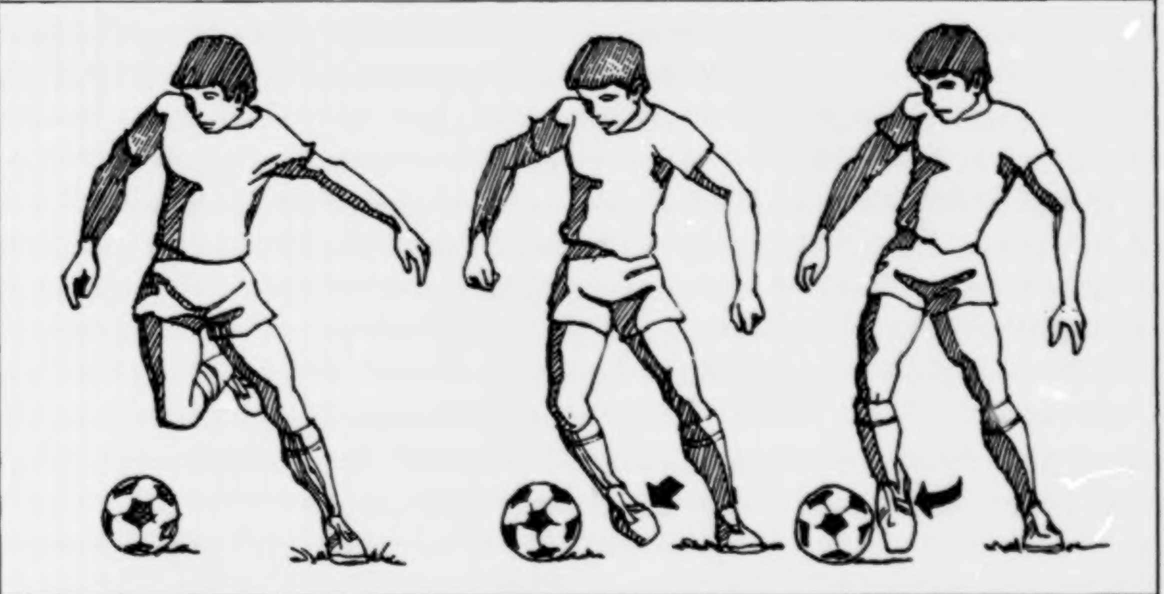


Figure 5. Outside of the Foot Pass



Performance Cues: (1) The kicking foot is the foot closest to the ball. (2) The toes on the kicking foot are pointed downward and rotated inward. (3) Contact is made with the outside of the foot, and the ball is kicked with a "flicking" motion.

Inside of the Foot Trap (Figure 6). The inside of the foot trap can be performed the same way as the inside of the foot pass except the foot is drawn back on contact to cushion the ball. This is the most commonly used trap and should be practiced constantly

Figure 6. Inside of the Foot Trap

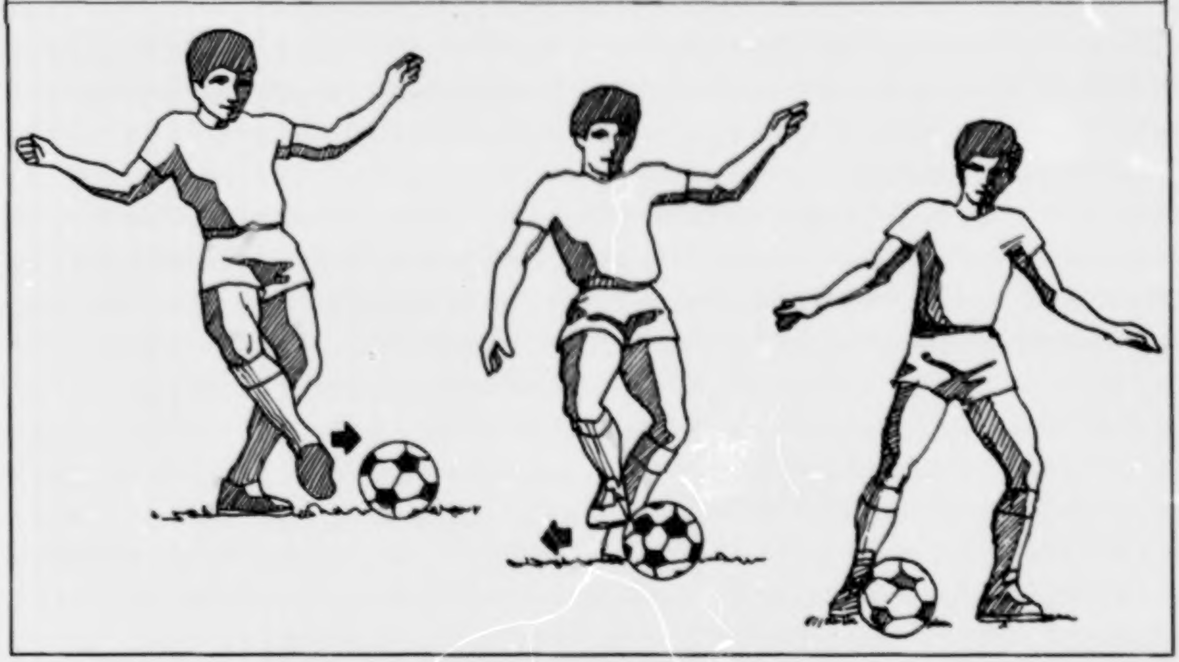
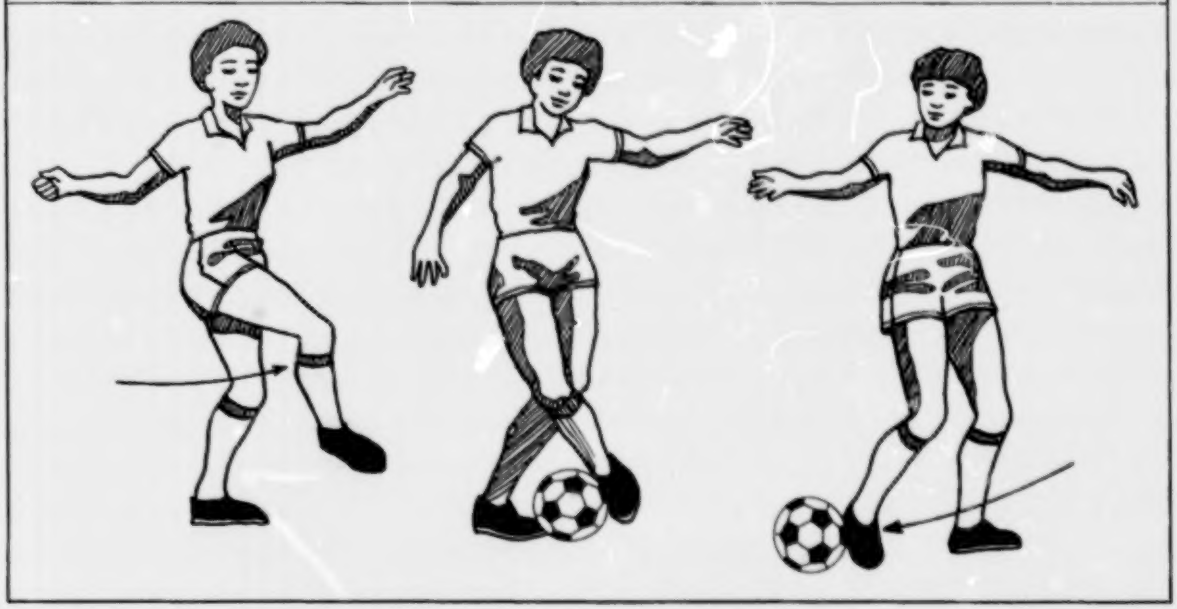


Figure 7. Outside of the Foot Trap



with both feet and while moving.

Performance Cues: (1) Place your weight on the nontrapping foot. (2) Turn the trapping foot outward and reach out to meet the ball. (3) Contact the top half of the ball with the inside of the foot. (4) "Give" with the ball and pull it back.

Outside of the Foot Trap (Figure 7). The outside of the foot trap should be used on two occasions. First,

if you are closely marked by an opponent, you can use this trap to control an oncoming pass while you use your body to shield the ball from the opponent. Second, you can use this trap if you are running and don't want to break stride to receive a pass coming to the foot closest to the oncoming ball.

Performance Cues: (1) The trapping foot is the foot closest to the ball. (2) The toes on the trapping foot are pointed downward and rotated inward. (3) The top half of the ball is contacted with the outside of the foot. (4) The ball is pulled in, close to the body.

Dribbling (Figure 8a, b)

Dribbling involves maintaining possession of the ball while moving. It is important for all players to learn dribbling skills so that they will not be constantly giving the ball up to the opposing team. Dribbling consists of light taps or touches with any part of the feet but most commonly involves the inside and outside of the feet. There is no one best way for a player to dribble; players develop their own dribbling styles. In fact, in many countries, dribbling is called "improvising" to reflect the individuality it provides for players. Nevertheless, there are several pointers that are important for developing dribbling skills.

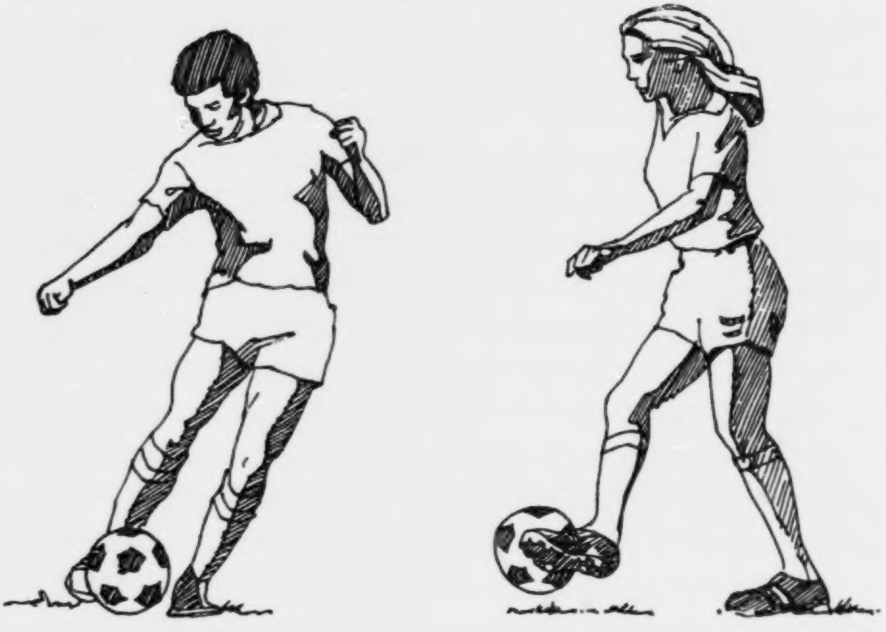
Performance Cues: (1) Keep the ball under control by using light taps of the inside and outside of the feet. Try to keep the ball next to your feet if you are in a crowd. (2) Go slowly (walking or slow jog) while you are first learning to dribble; the faster you move, the harder it is to maintain control of the ball. (3) Learn to use both feet while you dribble. (4) Place your body between the ball and the defender to shield the ball. (5) As your dribbling skills improve, look up so that you are aware of your teammates and opponents instead of looking at the ball. (6) Intersperse fakes (feints) into your dribbling to confuse defenders and allow yourself to create space.

Tackling

All players become defenders as soon as the opposing team has the ball. Therefore, it is essential to learn the correct tackling techniques in order to regain possession of the ball. Successful tackling is a matter of timing, technique, and courage.

It is important to remember that you must always play the ball instead of the opponent when you attempt a tackle. If, in the judgment of the referee, you are intentionally playing the person instead of the ball, a foul will be called. The penalty will be a direct kick, which may result in a penalty kick if it occurs in the penalty area.

Figure 8. Dribbling



There are three types of tackles commonly used in soccer: block tackles, poke tackles, and slide tackles. Each tackle may have an appropriate use, depending on the position of the defending player in relation to the attacker. However, because the slide tackle is so dangerous to both the attacker and defender, its use should be prohibited except for the most advanced levels of competition. Consequently, the slide tackle is not included in this chapter.

Block Tackle (Figure 9). Performed when the defender is in front of the attacker.

Performance Cues: (1) Assume a slight crouch with the feet staggered, one foot several inches ahead of the other. (2) Before starting the tackle, keep your eyes focused on the *ball*, not on the attacker's feet or body, so that you can minimize their attempts to use feints. (3) Use the inside of the foot to contact the top half of the ball just as it leaves the attacker's foot. (4) Keep your foot firm and follow through with the tackling foot. (5) Be sure to stay low and be ready to retrieve the ball once it is dislodged from the attacker.

Poke Tackle (Figure 10). Done from the side of the attacker.

Performance Cues: (1) Reach for the ball by extending your leg. (2) Contact the ball with your foot and "poke" the ball away with a jabbing motion. (3) Be sure to play the ball. Kicking or tripping the attacker will result in a foul.

Passing or Kicking Balls through the Air. These passes or kicks are used to (1) pass the ball to teammates from distances of 20 yards or greater, (2) take long shots on the goal, and (3) clear the ball away from your own goal.

Instep Kick. The instep kick generates considerable force. It is frequently used to score goals and for long, accurate passes.

Performance Cues: (1) Approach the ball from a slight angle and place the nonkicking foot about 12 inches from ball. (2) The ball should be contacted with the instep and with the toes pointed down. (3) The knee should be flexed and should be directly over the ball at the point of contact. (4) Follow through with the kicking foot and after contact.

Chip or Lob Pass (Figure 11). The chip pass is used to direct the ball to a teammate or into the goal when an opponent is in front of you and is thereby blocking the passing lane.

Performance Cues: (1) Approach the ball at a slight angle. (2) The nonkicking foot is beside and slightly behind the ball. (3) The foot contacts the bottom of

Figure 9. Block Tackle

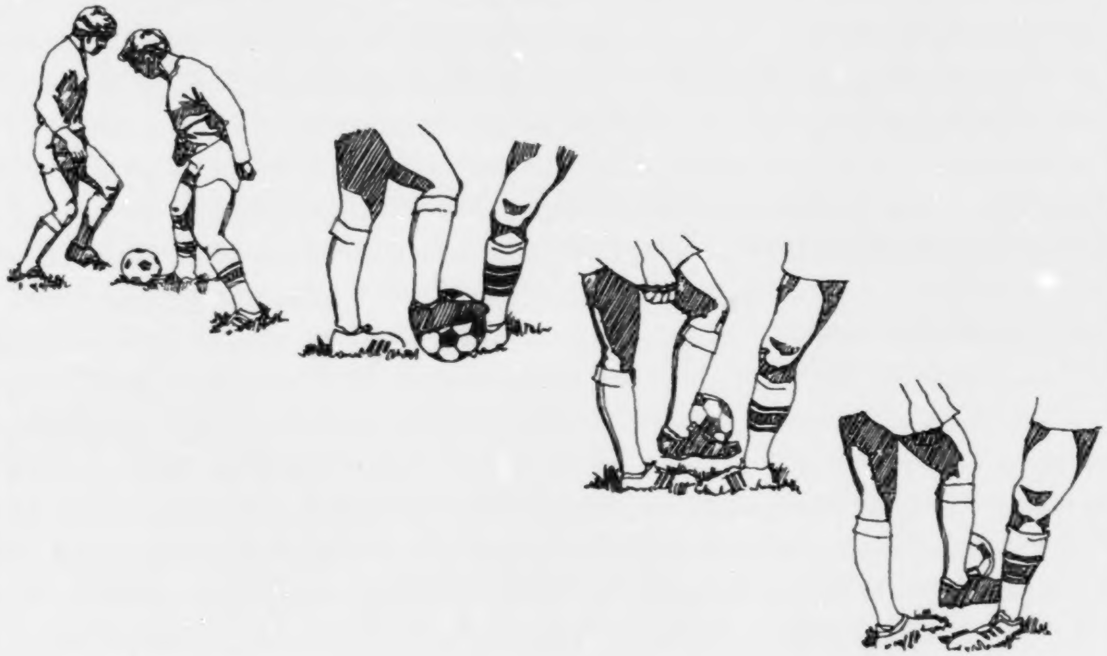


Figure 10. Poke Tackle

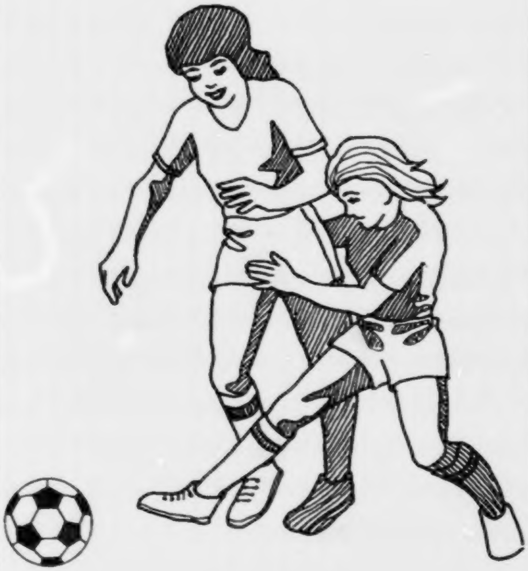


Figure 11. Chip or Lob

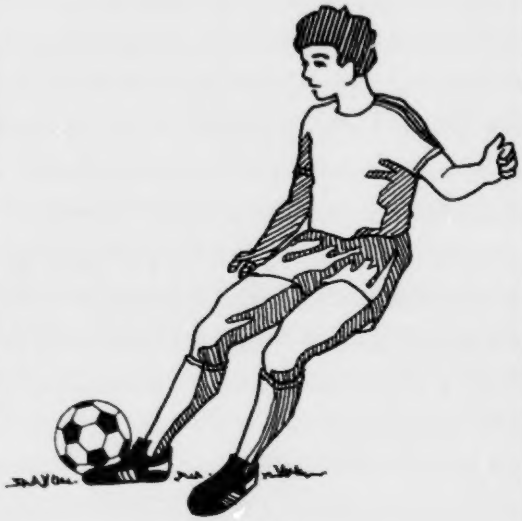
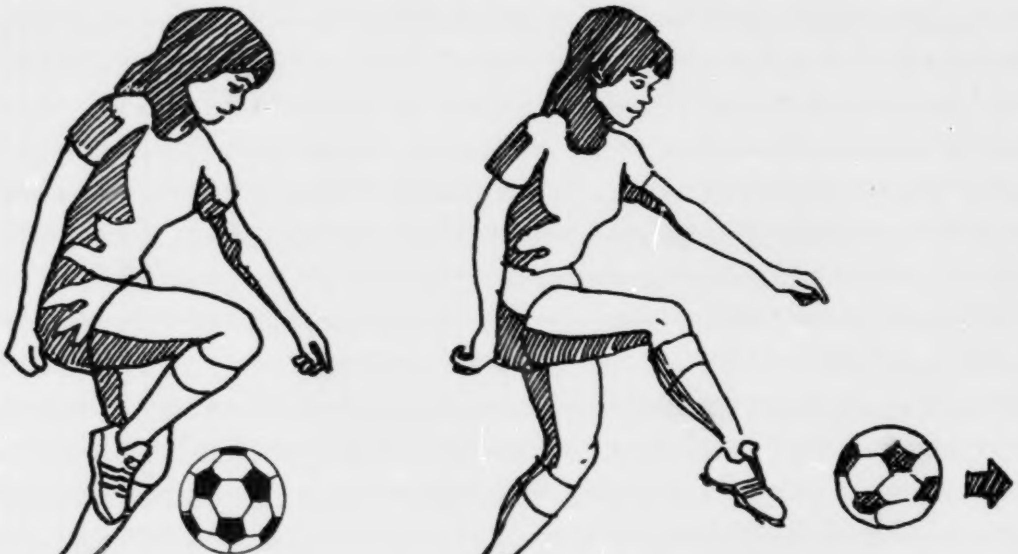


Figure 12. Volley Kick



the ball as if "cutting the grass with the cleats."

Volley and Half Volley Kicks (Figure 12). There are times when players must kick the ball while it is still in the air (volley) or as soon as it touches the ground (half volley). These situations usually occur when a defender is putting pressure on the attacker and there is no time to trap the ball and pass it once it hits the ground. These kicks require precise timing and considerable skill. They are therefore among the most challenging skills to learn.

Performance Cues: Volley Kick (1) Focus on the ball. (2) Place the nonkicking foot on the ground, with the knee bent, and extend your arms horizontally for balance. (3) Swing the kicking leg forward so that the knee is over the ball at the point of contact. (4) Your toes should be pointed downward when the ball is kicked. (5) Lean back if you want to loft the ball.

Half Volley Kick: All points listed for the volley kick apply here except that the ball is kicked immediately after it touches the ground.

Trapping Lofted Balls

Trapping balls that are in the air requires considerable practice because you must judge the ball's trajectory and time your trap to meet the oncoming ball. These traps are used most often when the player is under pressure and cannot wait for the ball to touch the ground.

Chest Trap (Figure 13). (1) Move into the path of the oncoming ball. (2) Arch the body backward and absorb the force of the ball with the upper part of the chest. (3) When contact is made, straighten the chest immediately to allow the ball to drop directly to your feet.

Thigh Trap (Figure 14). (1) Move into the path of the oncoming ball. (2) Raise your thigh to a position that is parallel to the ground. (3) Let the ball land midway between the knee and the top of the thigh. (4) Make sure the thigh is relaxed to cushion the impact of the ball. (5) Withdraw the thigh on contact so that the ball drops to the ground, next to the feet.

When a ball must be trapped as is moves parallel to the ground, use the stomach or chest traps described below. These situations generally arise when you receive a pass from a throw-in or when someone kicks a ball directly at you with great force.

Stomach and Chest Traps (Figure 15). (1) Stand with the feet parallel and the knees bent in the direct path of the ball. (2) Position the body in a way that

Figure 13. Chest Trap

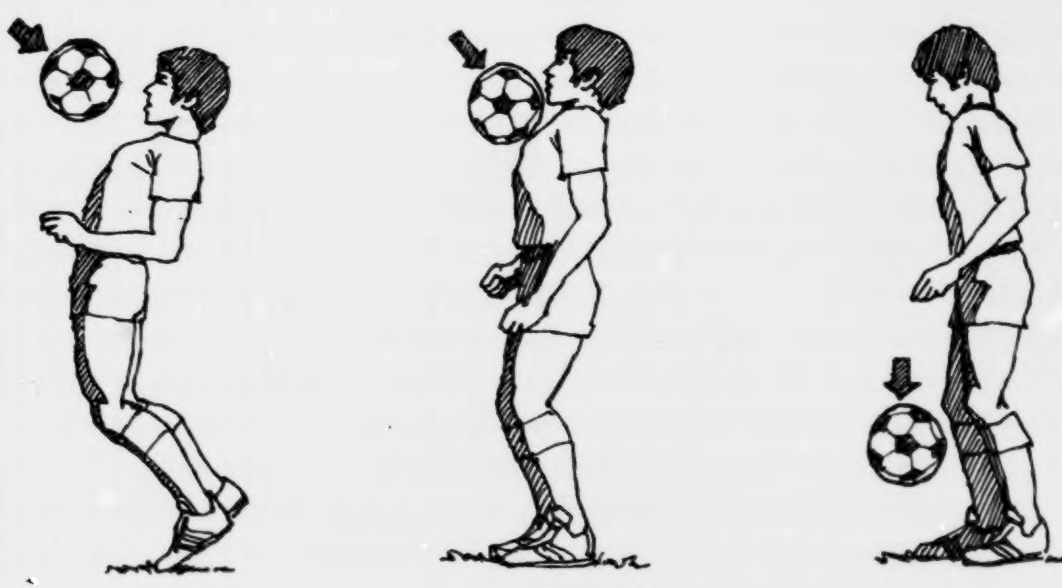


Figure 14. Thigh Trap

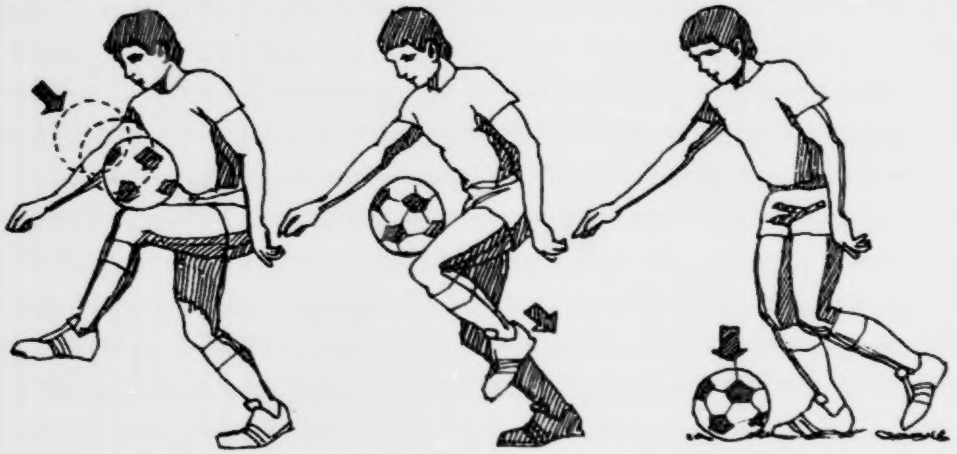
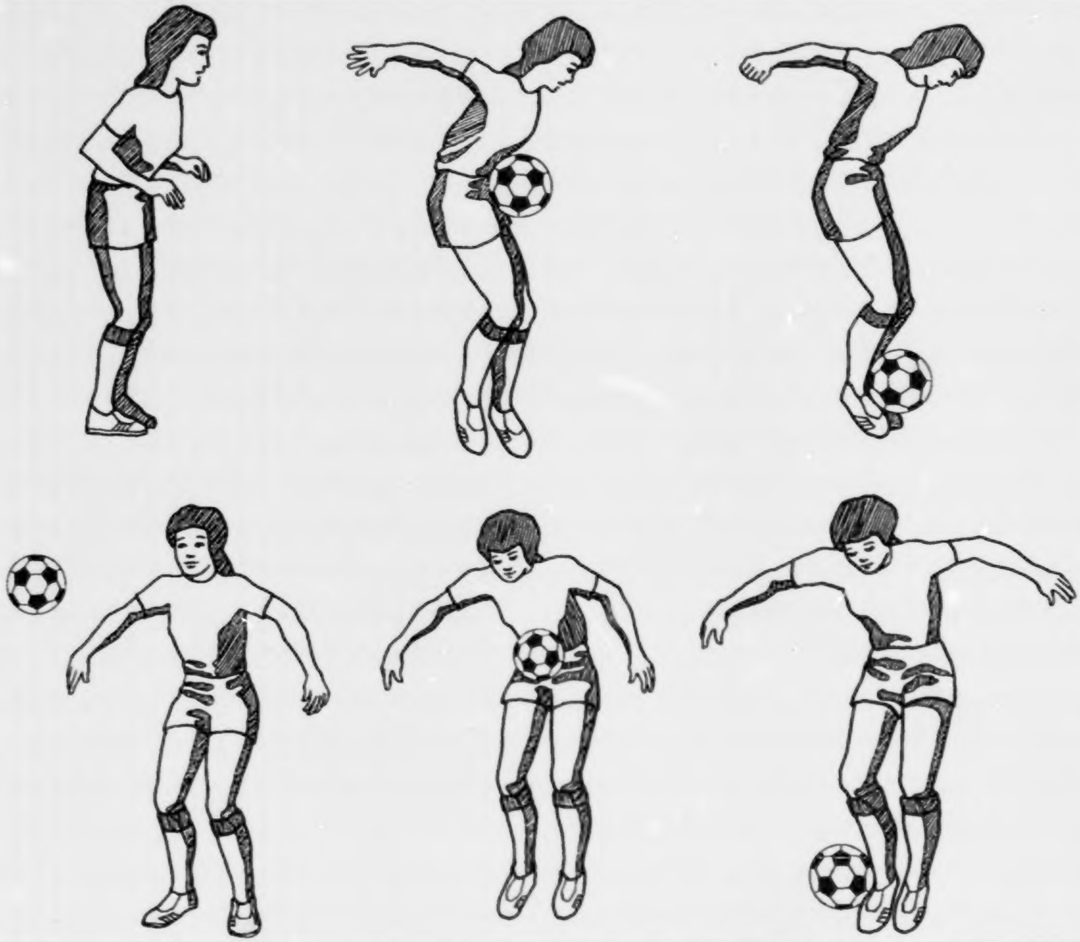


Figure 15. Stomach Trap



permits the ball to contact the stomach. (3) At the moment of impact, jump slightly backward and draw your abdomen in. (4) At the same time, lower your head, shoulders, and chest over the ball. (5) Let the ball drop to your feet.

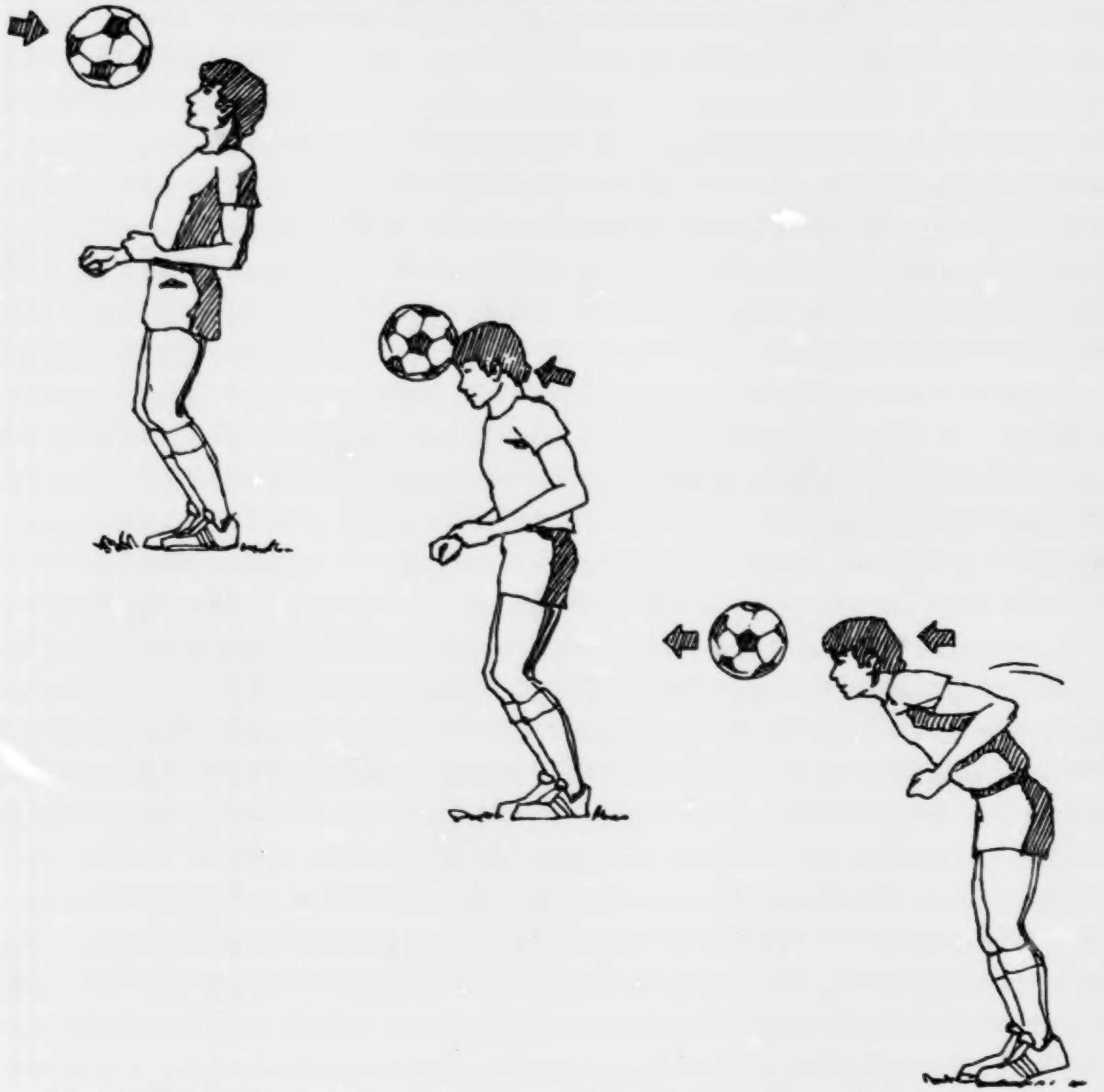
For balls sharply kicked toward the chest, use the same technique as for the stomach trap but contact the ball with the chest.

Heading

Heading is the ability to direct a ball by striking it with the head (actually the forehead). It is a technique that is unique to soccer and can be used in a variety of game situations. For example, heading may be used to pass balls to teammates, clear balls out of the defensive area of the field, or even to score goals. So when someone says, "use your head," take their instructions literally!

Heading can be done from both stationary and jumping positions but most of the same techniques apply to both situations.

Figure 16. Stationary Heading

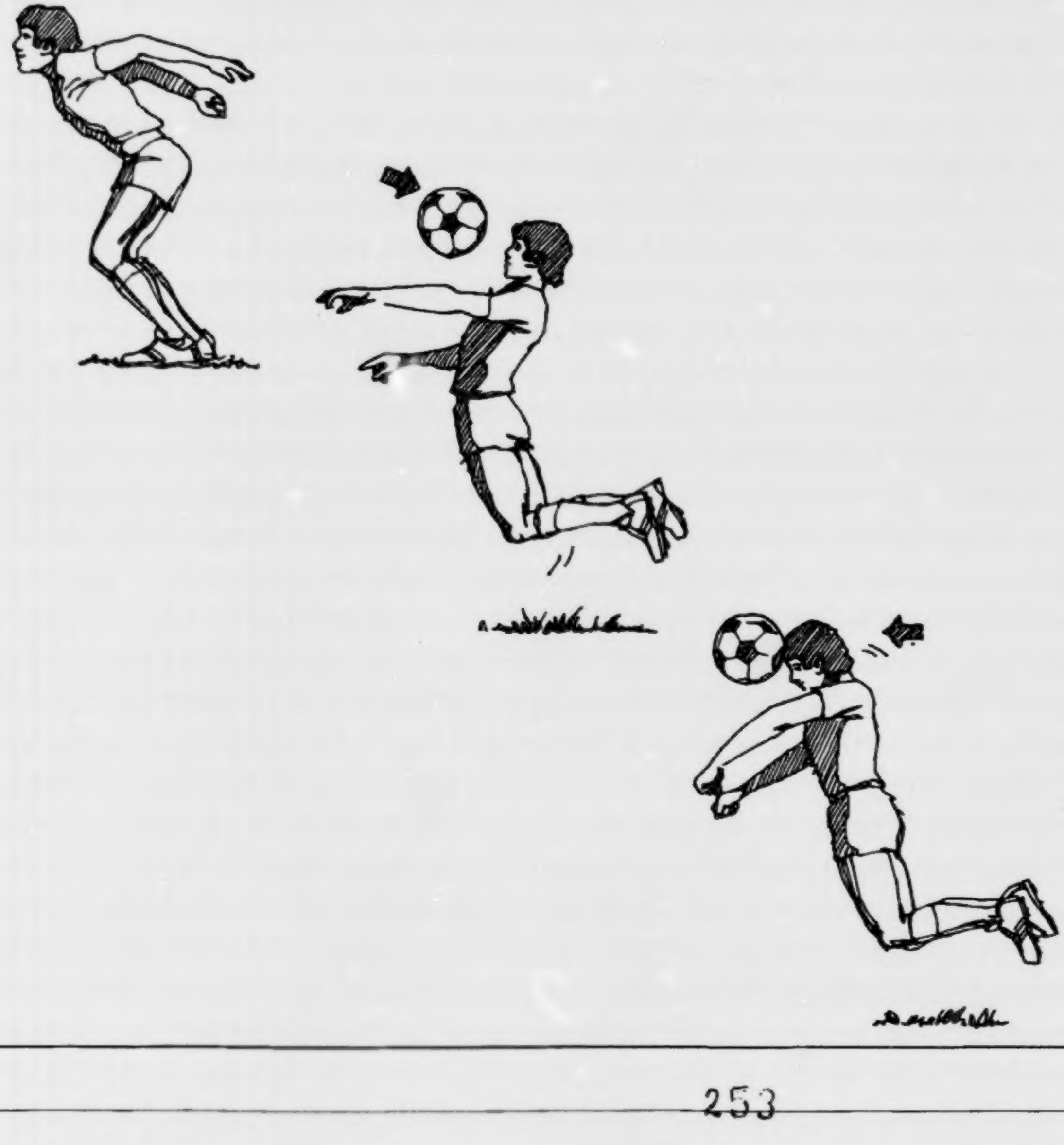


Stationary Heading (Figure 16). *Performance Cues:* (1) Assume a standing position with the feet slightly staggered and about shoulder width apart. The knees should be slightly bent, with the arms bent and forearms parallel to the ground to provide balance. (2) Focus your eyes on the ball and draw your head, shoulders, and neck backward as the ball descends. Your weight should be on the back foot. (3) Just prior to contact, spring the upper body forward and vigorously snap the neck to play the ball. (4) The ball should be contacted at the hairline (forehead) with your eyes open. (5) Follow through with a forward head snap in the direction the ball is to travel.

Jump Heading (Figure 17). The jump heading technique is the same as for stationary heading except for the following.

Performance Cues: (1) Jump straight up, taking off from both feet. (2) Tuck the heels to the buttocks. (3) Contact the ball at the peak of the jump, using the technique described for stationary heading. (4) Land with the knees bent.

Figure 17. Jump Heading



To be successful in heading and to prevent pain at the moment of impact, it is very important to keep the eyes focused on the ball, contact the ball at the hairline, and use a vigorous neck snap instead of simply letting the ball bounce off your head.

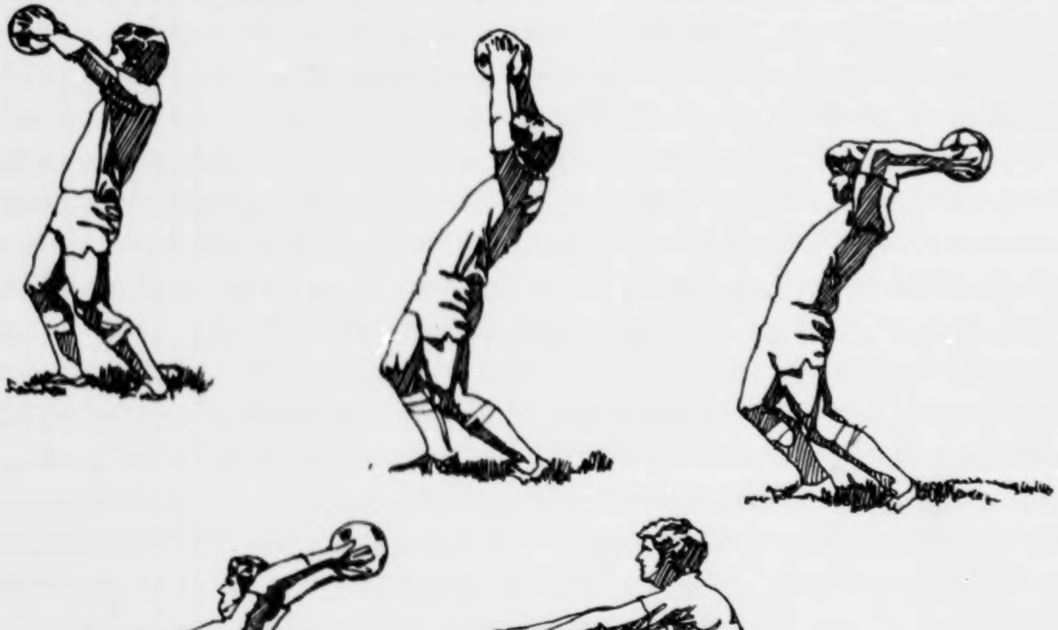
Throw-In (Figure 18)

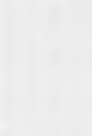
A throw-in is a skill that is used to put the ball in play from the sideline (touchline). Players should throw the ball to teammates so that their team can retain possession of the ball.

Performance Cues: (1) Place your hands directly behind the ball with your thumbs close together near the center of the ball. (2) Assume a stationary position with your feet staggered and about shoulder width apart. (3) Bring the ball back, directly behind your head, with your wrists and elbows bent. (4) To release the ball, flex the trunk vigorously, extend your arms forcefully and directly overhead, and snap your wrists as the ball is being released in the direction of the target. (5) Follow through by letting your arms come to the sides of the body during the follow through. (6) Both feet must remain on the ground after the ball is released.

An alternative method of throwing the ball into play is to take several steps before releasing the ball. This allows the player to generate greater force at the point of release. The technique for this method is the same as described above except that the back foot may be dragged along the ground.

Figure 18. Throw-In





Goalkeeping

The goalkeeper is the only player on a soccer team permitted to use his or her hands to play the ball. Therefore, goalkeepers must master an entirely different set of skills than field players. Goalkeepers must stop shots taken by the opposing teams. These shots come from all directions and trajectories. Goalkeepers should also learn to initiate their team's attack after making a save. Consequently, basic goalkeeping skills include the stance, fielding balls at different levels, methods of diving, and putting the ball in play by rolling, throwing, or punting it to teammates.

Goalkeeper's Stance (Figure 19). *Performance Cues:* (1) Stand with the feet shoulder width apart and pointed toward the ball. (2) Bend your knees slightly, incline your trunk forward, and distribute your body weight evenly on the balls of your feet. (3) Bend your arms at the elbows, with your forearms slightly above a line that is parallel to the ground, waist high. (4) Point your palms outward and focus your eyes on the ball.

Fielding Ground Balls (Figure 20). *Performance Cues:* (1) Move into position so that your body is directly in front of the oncoming ball. (2) Place your feet about five inches apart, with the toe of your back foot in line with the heel of your front foot. (3) Kneel with your knees outward. (4) Extend your arms downward, between your knees. (5) Catch the ball with your hands and pull it into your chest.

Fielding Ground Balls With Knees Slightly Bent (Figure 21). *Performance Cues:* (1) Position your body directly in front of the oncoming ball. (2) Place your feet two or three inches apart with your knees slightly bent. Bend at the waist. (3) Let your arms hang down, with your palms forward and your fingers spread and cupped near the ground. (4) Catch the ball and pull it to your chest.

Figure 19. Goalkeeper's Stance

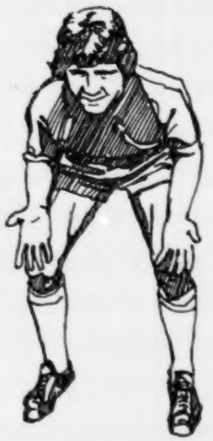
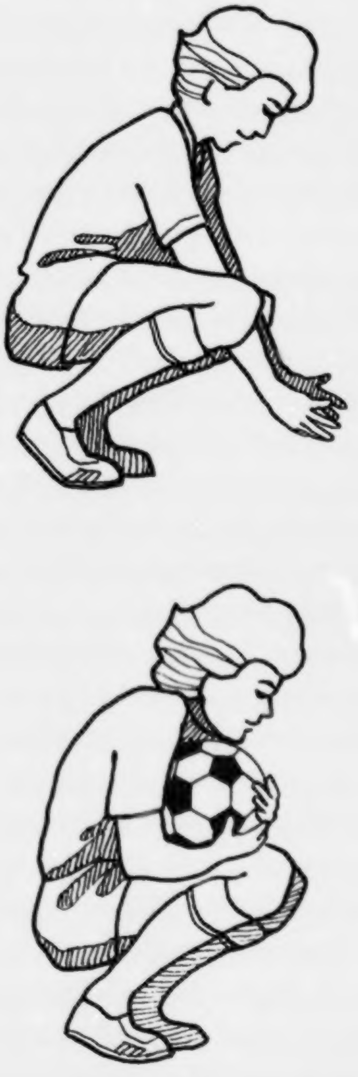


Figure 20. Fielding Ground Balls



Catching Knee- to Shoulder-High Balls (Figure 22). *Performance Cues:* (1) Assume the basic stance with your eyes focused on the ball. (2) Move to position your body directly in front of the oncoming ball.

Figure 21. Fielding Ground Balls — Knees Slightly Bent

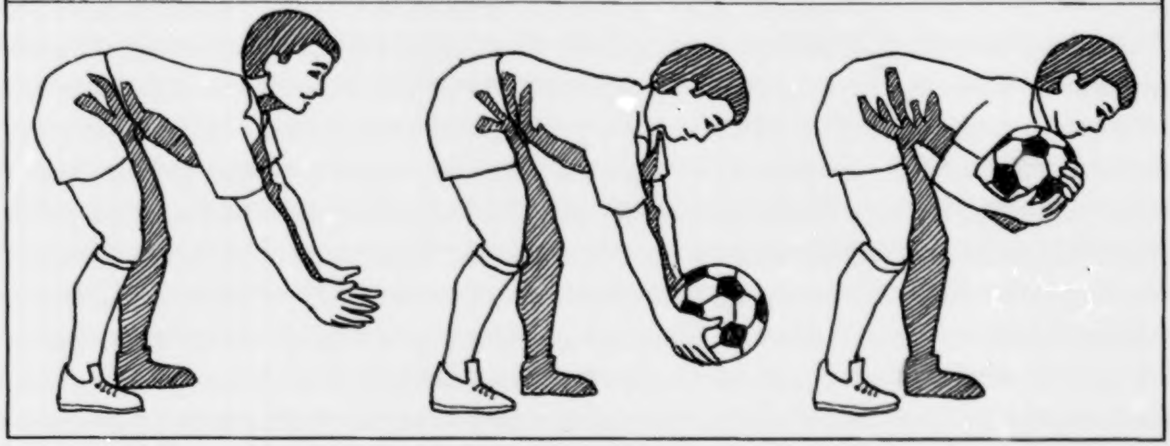
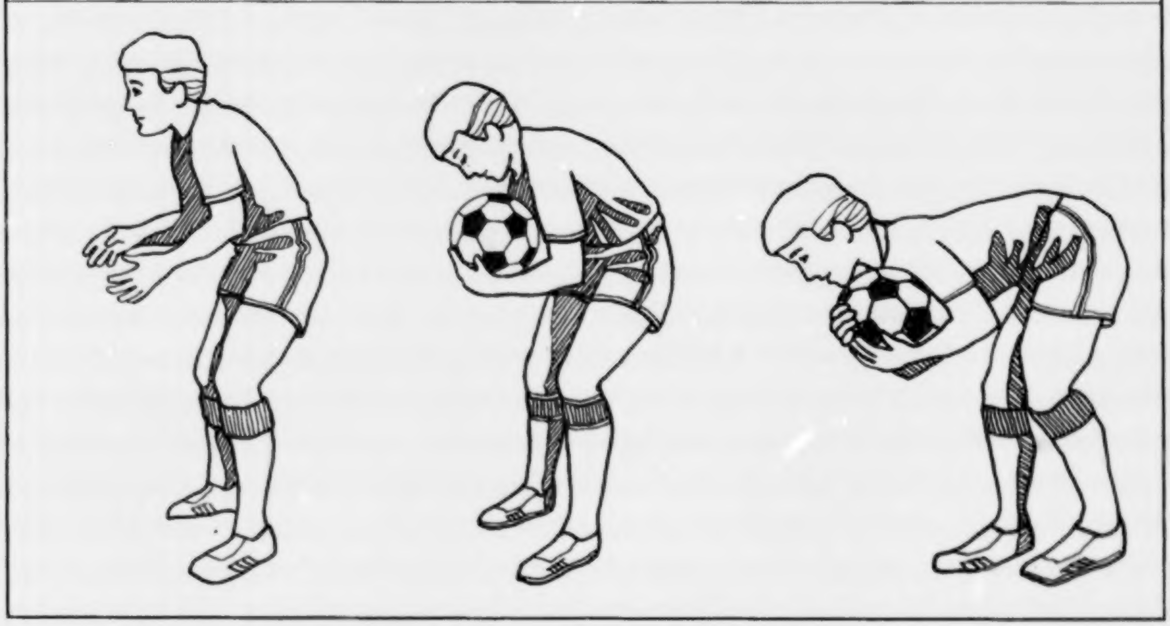


Figure 22. Catching Knee- to Sholder-High Balls

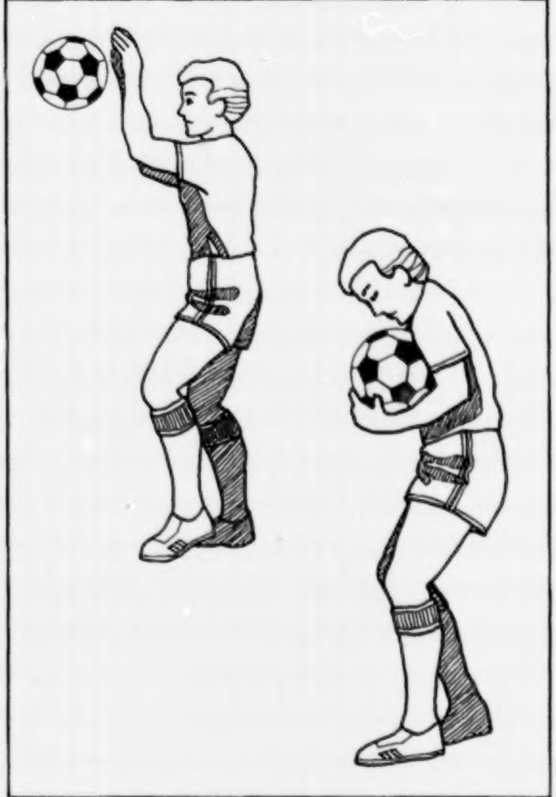


(3) Bend slightly forward at the waist to receive the ball at your stomach or chest level. (3) Your arms are outstretched and your hands cupped. (4) Catch the ball with your fingers spread and cushion the impact by bending your elbows and stepping backward slightly with one foot. (5) Bring the ball to your abdomen and surround it with your chest, shoulders, and arms. (6) When the ball is low, bend down on one knee and use the technique described above. (7) When the ball is at chest height, jump upward and use the technique described above.

Catching Balls Overhead (Figure 23). *Performance Cues:* (1) Reach in the direction of the ball with your elbows bent, palms facing the field of play, fingers spread, and thumbs and forefingers close together. (2) Catch the ball overhead and in front of your body with your hands directly behind the center of the ball. (3) Pull your elbows and shoulders backward to absorb the impact of the ball. (4) Bring your forearms together and tuck the ball into your chest.

For overhead balls that require jumping, use the technique described above except do the following:

Figure 23. Catching Balls Overhead



(1) Jump off one foot. (2) Jump vertically and stretch your arms toward the ball. (3) Catch the ball at the peak of your jump.

Diving and Catching Ground Balls (Figure 24). *Performance Cues:* (1) Assume the basic stance with your eyes focused on the ball. (2) Step sideward with the foot closest to the oncoming ball. (3) Push off forcefully from both feet and fall sideward and slightly forward, diagonally away from the goal line. (4) Extend your arms to reach the ball with your thumbs and fingers close together and your palms facing the ball. (5) Fall on your side in the direction of the ball in this order: side of foot, lower leg, upper leg, hip, and trunk. (6) To catch the ball, place your upper hand on top of the ball and your bottom hand on the lower part of the ball. (7) Pull the ball into your chest.

Avoid diving with the face down; always land on the side of the body. When learning to dive, start from squatting or kneeling positions and use jumping pits or other soft surfaces to absorb the force of landing. Avoid diving after balls in the air because this is an advanced and dangerous skill for beginners.

Rolling Balls to Teammates (Figure 25). *Performance Cues:* (1) Focus your eyes on the intended target. (2) Stand in a crouched position with your dominant hand supporting the ball with your palm, fingers spread. The other hand rests on top of the ball. (3) Shift your body weight to your back foot and swing the ball to the side of your body with both hands. (4) At the end of the back swing, release your top hand and start a forward sweep with your dominant arm. (3) Shift your body weight forward and continue bringing the ball forward with a straight arm. Release the ball when your arm is perpendicular to the ground. (4) Follow through by pointing your fingers, palm up, directly at the target area on which your eyes are focused. At first, practice rolling the ball from a stationary position (as illustrated) and then from a running position. Use this technique to deliver balls quickly and accurately to teammates from short distances.

Javelin (Round Arm) Throw to Teammates (Figure 26). *Performance Cues:* (1) Hold the ball deeply in your palm, encased by your fingers and wrist. (2) Extend your throwing arm backward and shift your weight to the rear foot. (3) Step toward the target and use a whiplike (javelin) action, keeping your elbow locked to release the ball. (4) Release the ball just after it passes directly over the top of your head. This technique is preferable to the baseball throw. It is more accurate, and the ball can be thrown farther.

Practice for Improvement

As you practice the skills described in the Soccer Skills section, try to focus on three guiding principles:

1. Learn each technique before you attempt to apply it to game situations. Everyone wants to play games. But playing will be more fun and satisfying once you are able to apply the skills listed in the Soccer Skills section to either modified or regulation soccer games. So be certain that you understand how each skill is done and can demonstrate correct technique *without* a ball and under restricted conditions before you attempt it in competitive situations.
2. The only way to develop the ball control skills necessary to become skillful is to maximize your "touches" on the ball. Many of the suggestions that follow are made with this principle in mind.
3. Your soccer skills will improve only as you learn to execute them under increased pressure. Pressure can be applied through such actions as

Figure 24. Diving and Catching Ground Balls

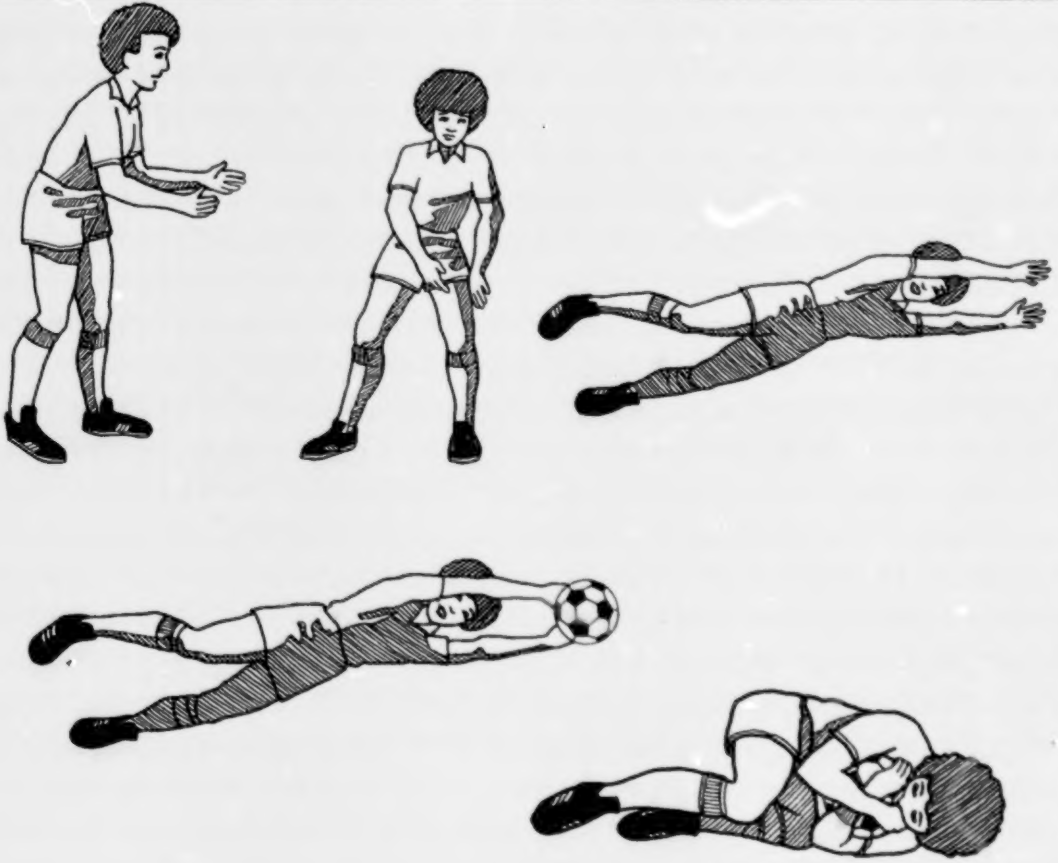


Figure 25. Rolling Balls to Teammates

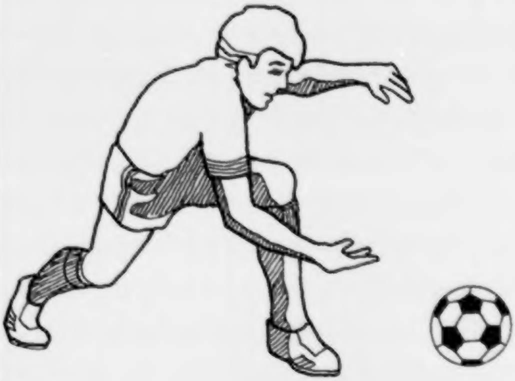
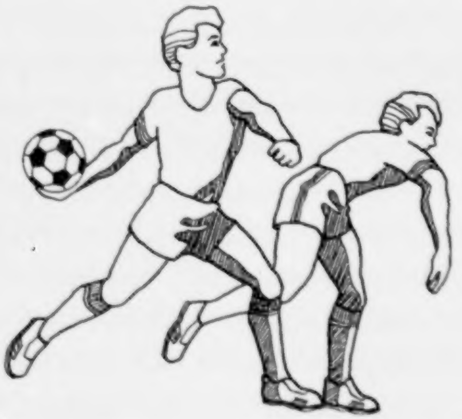


Figure 26. Javelin (Round Arm) Throw to Teammates



decreasing the time, space, and number of touches permitted to control the ball, adding defenders to ball control drills, etc. Many of the suggestions and drills in the Practice for Improvement section attempt to facilitate skill development under pressure.

A "Skill Improvement Continuum" is listed below. You can use the continuum to both assess your current skills and to focus on improvement during classes or practices. If you can perform the skill under "Less Difficult" conditions, then challenge yourself to master it under "More Difficult" conditions. This is the fastest way to improve your skills and should make practicing even more fun and challenging. Although the continuum contains only selected soccer skills and skill levels, the principles can be easily adapted to any skill or proficiency level.

Skill Improvement Continuum

Skill	Less Difficult	More Difficult
1. Trapping	Trap ball while standing still	Trap while jogging/running
	Unlimited touches to control ball	Allow only one or two touches
	Trap rolling ball	Trap bouncing ball
	Trap using dominant foot	Trap with either foot
2. Dribbling	Dribble while walking, using inside of feet	Dribble while jogging, using both inside and outside of feet
	Dribble in one direction	Dribble while changing directions
	Dribble in open space	Dribble while being passively marked by a defender, using feints and shielding the ball
3. Inside of Foot Pass	Use dominant foot	Use either foot
	Pass to wall	Pass to partner or through cones, 10 yards away
	Pass while standing still	Pass while in motion and/or being marked by defender
	Pass a stationary ball	Pass a moving ball without trapping it (one touch)
4. Instep Kick	Kick a stationary ball	Kick a rolling ball
	Kick ball to partner, 20 yards away	Kick ball into goal, past goalkeeper, from 20 yards away
5. Heading	Head a ball from a self-toss	Head a ball tossed by partner from 10 feet away
	Head ball into general space	Head ball to target or to partner's feet
	Head ball back to partner while both feet are on the ground	Head ball while jumping to a teammate 10 yards away
6. Goalkeeping	Catch waist-high balls tossed from 5 yards	Catch waist-high balls kicked from top of penalty area
	Dive for ground balls from kneeling position	Dive for ground balls from standing position
	Catch or dive for shots taken from penalty mark	Catch or dive for shots taken from different distances or angles

General Suggestions to Facilitate Skill Improvement

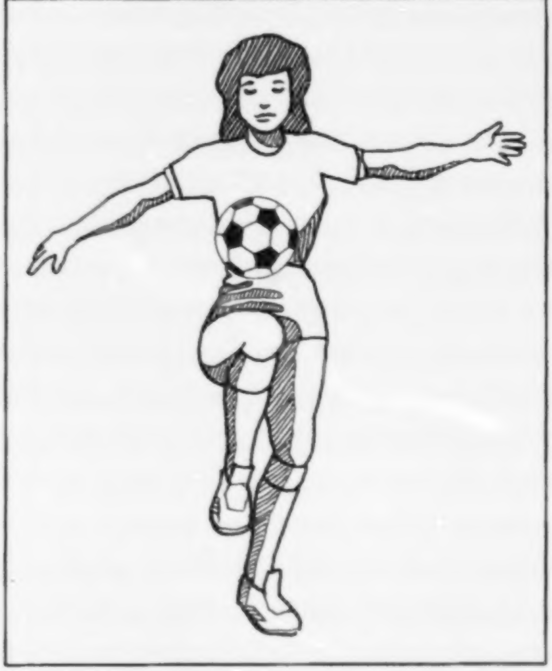
1. Whenever possible, each player should have a ball. This will maximize your number of touches.
2. Use a wall to increase the number of repetitions you receive for trapping and passing skills. If a wall is not available, use a partner. Pass and trap the ball back and forth as rapidly as possible, using the correct techniques.
3. When first learning the skills of heading and trapping lofted balls, it is best to use a self-toss to minimize the necessity for judging the trajectory of the oncoming ball and to decrease its impact. Once the proper techniques are learned, use a partner toss from a short distance. Heading skills may also be practiced from kneeling or sitting positions because these positions force you to use a vigorous neck snap to return the ball.
4. A self-toss is also the best way to first practice the volley and half-volley kicks. When you first practice these skills, do not be concerned with the accuracy of the kick. Instead, focus on timing the ball properly so that solid contact is made.
5. When learning to dribble, concentrate on keeping the ball under control as you move. A good rule of thumb is to attempt to dribble with the ball within one step of your feet. Start off walking with the ball and then try to increase your speed to a slow jog. Gradually work on changing directions and integrating fakes (feints) into your dribbling because these are necessary for beating an opponent in game situations. Remember, dribbling is often called "improvising," so be creative!
6. Challenge yourself to improve your trapping skills by reducing the number of touches you need to bring the ball under control. Strive to have the ball at your feet, ready to play, after one or two touches. Remember, the first touch is critical.
7. Focus on passing the ball either to a teammate or a target (through field markers, cones, etc.) Just kicking the ball into an open space is not helpful; it creates a "free ball," and your team will likely lose possession. Instead, have a purpose for each pass.
8. Goalkeeper's skills are learned best by first practicing the correct catching technique under very restricted conditions. For example, a partner toss from 5 yards should be used to develop proper catching techniques. Diving for ground balls should first be practiced from a kneeling position to reduce the chance of injury while developing the proper technique.
9. Constantly strive to integrate skills. During games, most skills are not performed in isolation; they are done in combinations. For example, a trap is followed by either dribbling or passing the ball.
10. Try to integrate skill development and conditioning during practices. Run hard during skill development drills and dribble a ball while you are completing your conditioning activities.
11. Tackling requires both proper technique and timing. Learn the correct technique for each tackle and remember to make your move on the ball just as it leaves the dribbler's foot.

Selected Soccer Drills

There are many effective and enjoyable soccer drills that you can use to improve your skills. However, the following drills are particularly worthwhile because they reinforce the principles of maximizing touches and can be made increasingly more difficult to create pressure appropriate for players' skill levels. In addition, they are simple, challenging, and can be used as warm-ups. As you review these drills, notice that the time spent standing in lines and/or taking turns is eliminated.

1. **Juggling (Figure 27).** Juggling involves keeping the ball in the air with soft touches and is an excellent way to improve your ball control skills. Juggling is an individual activity that you can do every day to improve your skills. Juggling is normally done using the inside of the foot/instep, thigh, or head. However, once your juggling skills improve, you can use any body part to keep the ball from hitting the ground. To use the inside of the foot/instep or thigh, start by holding the ball in your hands. Then drop it and softly tap it back into your hands. Repeat this procedure to the opposite side. For heading, toss the ball several inches above your forehead, head it straight up, and then catch it. Once you can do this, add complexity to juggling by eliminating the ball catch so that you are now tapping the ball off your feet, thighs, or head. You can challenge yourself by counting how many times you can tap the ball without it hitting the ground, alternating body parts with each tap, etc.

Figure 27. Juggling



2. **Create a Space.** This drill is done with three players in a confined area (10x10 yards or the center circle work well). One player starts with the ball. After passing the ball, the player sprints to the left or right in order to create a passing line for the player who receives the pass. Once the pass is received and controlled, the second player passes the ball and sprints to create space for the third player. This procedure is continued for a specific time or number of touches. The drill can be made more difficult by creating restrictions about how the ball is played (can only use a certain pass or trap, must one- or two-touch the ball, etc.).
3. **Keep Away (also called Consecutive Passes).** Assign teams so that the offensive team has more players than the defense. Within a confined area, the offensive team attempts to keep the ball away from the defense by passing the ball to teammates. This drill incorporates many ball control skills such as short passing, trapping, and tackling. In addition, it alerts players to the tactic of creating space and helps them learn when to dribble and when to pass the ball. Keep Away works best with three or four players on a team within an area about 10x10 yards. For beginners, however, having two offensive players against one defender works well. As skill levels improve, the number of players on each team can be equalized. The game can be made more challenging by restricting the types of passes/traps that can be used, permitting only one or two touches on traps, giving the ball to the defensive team if they deflect a pass, etc. You can also keep score by counting the number of consecutive passes made before the defense steals the ball. A variation of this game is that the ball must be passed to a specific offensive player. This forces each player to move into a space to receive a pass.
4. **Follow the Leader.** Players are in groups of three. At the beginning of the drill, players are in a line and the middle player has a ball. Once the drill begins, the first player (leader) alternates walking, jogging, and sprinting in different directions. The middle player dribbles the ball and attempts to stay close to the leader. On a signal, the leader goes to the end of the line, the dribbler becomes the leader, and the last player assumes the dribbler's position.
5. **Pass and Follow.** Two players stand next to each other, with a third player about 20 yards away. An inside of the foot pass is made to the third player. As soon as the pass is made, the player making the pass sprints to the position of the player receiving the ball. The player who receives the first pass then passes it to the remaining player and sprints to that player's position. This procedure is repeated. The game continues until a set number of passes is made.
6. **Agility/Coordination Drills.** The agility drills in Figure 1 should also be used to improve your skills and should be done at each practice.

Small-Sided Games

Did you know that during a regulation match of 90 minutes, the typical player possesses the ball for fewer than four minutes? This means that regulation games, as well as drills that require waiting in line, are very inefficient ways to improve players' skills because they fail to meet the players' need to frequently touch the ball.

Small-sided (modified) games are an excellent solution to this problem. Small-sided games combine skill development with opportunities to improve

stamina and learn tactics by reducing the size of the playing field and the number of players. In fact, Keep Away (see above) is an example of a small-sided game that is often played to develop ball handling skills and tactical awareness.

A small-sided game is typically played in a confined space called a grid. The boundaries of each grid are set by placing small cones or other objects in each corner. The size of the grid as well as the number of players is dictated by the purpose of the game. Rules for each game are also modified according to its purpose. Examples of common small-sided games are, 1 vs. 1, no goals; 2 vs. 1, no goals; 3 vs. 3, with goals, etc. (see Diagram 1). The rules for any of the games could be modified to require the use of certain traps or passes, a certain number of touches or consecutive passes, etc. Also remember that the ratio of defenders to attackers as well as the size of the grid may be altered at any point to make the game more difficult or "pressurized."

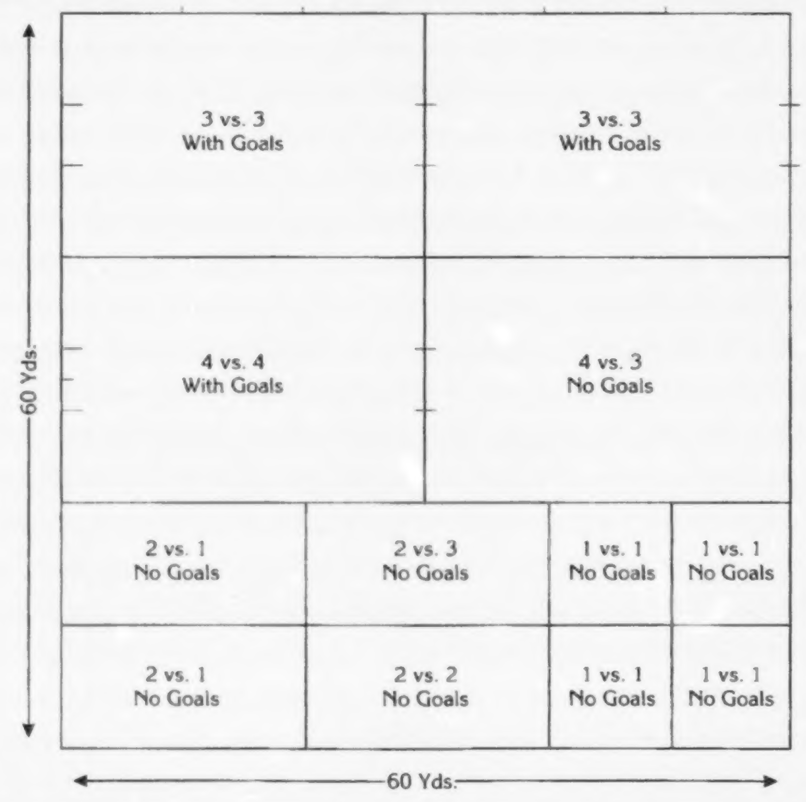
Safety Concerns

Even though soccer is among the safest sports played in schools, injuries do occur. Fortunately, the vast majority of these injuries are not serious (abrasions, sprains, contusions, etc.). Most injuries in soccer are the result of contact between players as they attempt to play the ball.

Players can take several actions to reduce their chances of sustaining an injury. Players' preventative actions may be grouped into five areas.

1. **Maintain good physical condition.** Follow the steps described in the Fitness Requirements section to build and maintain the physical fitness components that are most important to soccer. Remember to warm up thoroughly each day to elevate your muscle temperature and prevent soreness. Also use a cooldown to prevent cramping and soreness. Maintaining good aerobic fitness is extremely important because fatigue will cause your techniques to deteriorate,

Diagram 1. Example of Small-Sided Games on a 60 x 60 yd. Field



thereby increasing your chances of injury. For example, when you are tired, you are less likely to get into the proper position to make a tackle. You will find yourself reaching for the ball instead of being in front of the dribbler, thereby jeopardizing both your own and the dribbler's safety.

2. **Learn and use the proper techniques.** Three skills often lead to injuries if they are not executed properly: tackling, heading, and the goalkeeper's dive for ground balls. Be sure to learn each technique and apply it properly to practice and game situations. Briefly, you should (1) avoid tackling the dribbler from behind, stay on your feet when you attempt a tackle (no slide tackles), and always play the ball, not the dribbler; (2) jump vertically for a head ball, not in a way that will cause you to jump into an opponent; and, (3) land on your side, not your stomach, when diving for ground balls.

   Two other precautions are also relevant to preventing injuries. First, follow the skill progressions as they are taught. Second, do not attempt advanced skills that you have not been taught.

3. **Follow the playing rules.** In particular, (1) remove jewelry and watches before you start to play, (2) avoid heading a ball that is below your waist or kicking a ball that is above your waist (this is called a "dangerous play"), and (3) avoid collisions with the goalkeeper.
4. **Wear proper equipment.** All players should wear shin guards, eye guards, and mouthpieces, and males should wear athletic supporters. The goalkeepers should wear brightly colored shirts to distinguish them from the field players.
5. **Report any dangerous conditions.** Report any holes or dangerous objects on the field such as rocks, glass, etc. Also report any jagged edges on the goal posts or crossbar.

Competition

Soccer rules (called laws), including the size of the playing field, ball characteristics, duration of play, etc., are frequently modified for various levels of play to best accommodate the needs of the players. There are 17 official soccer rules. The explanation of these rules has been simplified below to help beginning players learn how soccer is played.

The Playing Area, Ball, and Equipment

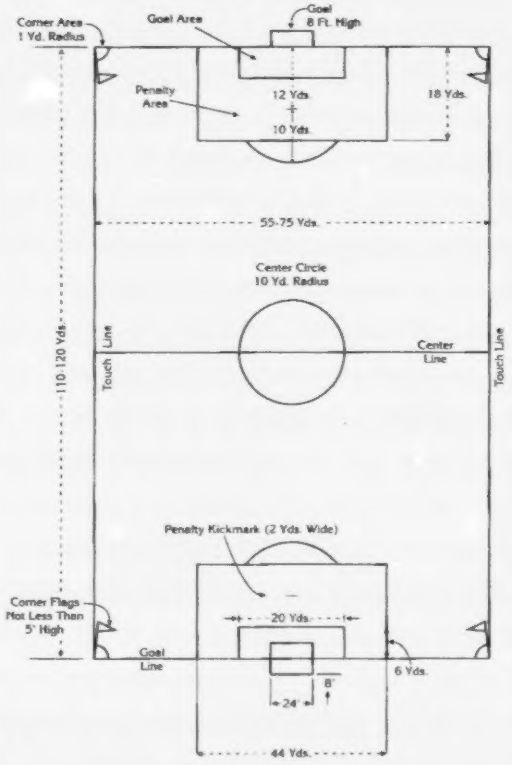
(See Diagram 2)

A regulation soccer field is rectangular and is 110-120 yards long and 55-75 yards wide but can be much smaller to accommodate children of different age groups. The field includes two penalty areas, two goal areas, a centerline, a center circle, and four corner kick areas. Within each penalty area are a penalty kick mark and a goalkeeper area. The sidelines are known as touchlines, and the end lines are called goal lines. An arc with a radius of 1 yard and a flag, at least 5 feet high, are located in each corner of the field. The goals are 24 feet wide and 8 feet high and are typically made of wood, metal, or pipe.

An official soccer ball is made of leather or a synthetic material. It is 27-28" in circumference and weighs 14-16 ounces (size 5). Younger players often use a size 3 or 4 ball because the smaller size allows for better control.

The equipment commonly worn by soccer players includes a jersey, shorts, knee-length socks, mouth-

Diagram 2. Regulation Soccer Field



piece, shin guards, and shoes. Shoes are the most critical item of equipment. They should fit snuggly and consist of molded, rubberized cleats. Goalkeepers must wear a distinctive jersey to identify them from the field players. They frequently wear gloves, kneepads, and elbow pads to protect themselves. Players are prohibited from wearing watches or jewelry.

The Players

(See Diagram 3)

A soccer team consists of 11 players, who play the following positions:

Goalkeeper (goalie) – The player who defends the goal against attempts to score. The goalkeeper is the only player allowed to touch the ball with the hands. However, this privilege is permitted only in the penalty area. The goalkeeper must possess sound judgment about when to come off the goal line, a keen knowledge of tactics, excellent agility, and quick reactions. Once the goalkeeper collects the ball, he or she can initiate the offense by rolling or throwing the ball to an unmarked teammate.

Defenders (backs or fullbacks) – The last line of defense before the goalkeeper. Defenders attempt to take the ball away from their opponents in their defensive area of the field and prevent the attacking team from shooting on goal. Typically, there are four defenders—two wings, the stopper, and the sweeper.

Midfielders (halfbacks) – Provide a link between the offense and defense. They are frequently called on to support both the defenders and the forwards and must therefore be strong all-purpose players with great endurance. The midfielders are critical because the team that controls the middle of the field generally wins the game. Teams may play with two, three, or four midfielders, depending on the alignment or system they use.

Forwards (strikers) – Play nearest the opponent's goal and are the primary offensive players. They should possess excellent shooting and dribbling skills. Teams often play with two, three, or four forwards. The forwards who play closest to the touchlines are called wings.

Several common alignments or "systems of play" are provided in Diagram 3. However, because soccer is a game that emphasizes freedom, spontaneity and individual movement, players are given many opportunities to switch positions during the game.

Playing Rules

The game of soccer consists of two halves and is begun with a kickoff from the center of the field. Every player must be in his/her own half of the field before the ball can be kicked. The ball must travel one revolution forward before it can be touched by another player. Kickoffs occur at the start of each half and after each goal. A goal may not be scored directly from the kickoff.

After the kickoff, play continues until the ball passes out-of-bounds, a penalty or injury occurs, or a goal is scored. A goal is credited only when the entire ball passes over the goal line and into the goal. A ball that is on, or only partially over the goal line does not count as a goal.

A goal cannot be scored if an offensive player is offside. Offside occurs when an offensive player is nearer to the opponent's goal line than the ball unless: the player is in their own defensive half of the field; two defensive players are between the offensive player and the goal line, or the ball was last played by the defensive team. In addition, a player cannot be offside on a corner kick, goal kick, or throw-in. It is permissible for a player to move into an offside position to receive a pass if they move *after* the ball has been played by a teammate.

The ball is out-of-play when it crosses completely over the touchline or goal line, either on the ground or in the air. If the ball passes over the touchline, play is resumed by a throw-in, awarded to the team that did not touch the ball last. If the ball goes out of play over the end line, the game is restarted either with a goal kick or a corner kick. If the offensive team last touched the ball, a goal kick is awarded to the defensive team. If the defense last touched the ball, the game is restarted with a corner kick taken by the offensive team.

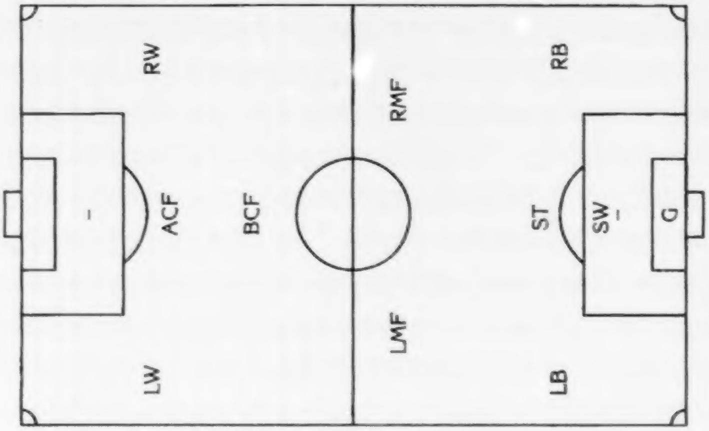
A drop ball is used to restart play following an injury or double foul or after the referee halts play for any other reason. To resume play, the ball is dropped between two opposing players. The ball must touch the ground before it can be played.

There are two categories of fouls: minor and major. Minor fouls result in indirect free kicks; major fouls result in direct free kicks. Indirect free kicks must be touched by a second player before a goal is allowed. Indirect free kicks are the result of technical violations such as offside, obstruction, the goalkeeper taking too many steps, etc. A goal may be scored from a direct free kick without the ball being touched by another player. Direct free kicks result when a player fouls an opponent (kicking, tripping, pushing, holding, etc.) or intentionally handles the ball in a way that gives his

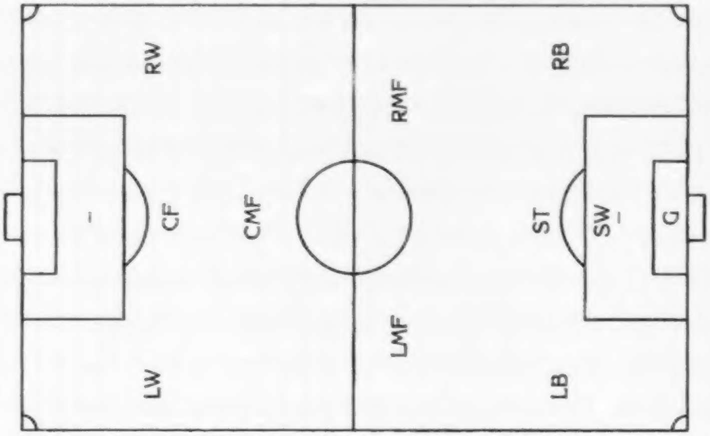
Diagram 3. Sample Player Alignments or "Systems of Play"

Player Key

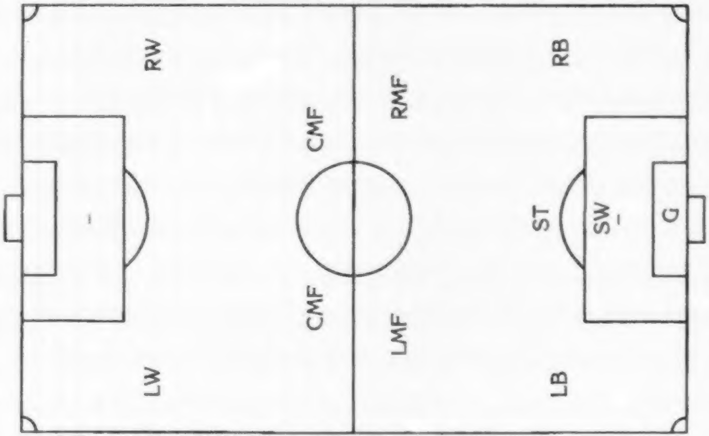
G = Goalkeeper
SW = Sweeper
ST = Stopper
C/R/L MF = Midfielder
CF = Center Forward
ACF = Attacking Center Forward
BCF = Backup Center Forward
L/RW = Left/Right Wing
L/RB = Left/Right Back


RW
ACF
BCF
LW
RMF
LMF
RB
ST
SW
G
LB

a. 4 Forwards, 2 Midfielders, 4 Backs


RW
CF
CMF
LW
RMF
LMF
RB
ST
SW
G
LB

b. 3 Forwards, 3 Midfielders, 4 Backs


RW
LW
CMF
CMF
RMF
LMF
RB
ST
SW
G
LB

c. 2 Forwards, 4 Midfielders, 4 Backs

or her team an advantage. Direct free kicks are not awarded if doing so places the team that is fouled at a disadvantage. This is called the advantage rule.

If the defensive team commits a major foul in its penalty area, a penalty kick is awarded. This is a free kick taken from the 12-yard line (penalty mark) with only the goalkeeper between the ball and the goal. All players except the offensive player taking the kick and the goalkeeper must remain outside of the penalty area until the ball is kicked.

The officials for a regulation soccer game consist of a referee and two linesmen. The referee remains on the field and controls the game. The linesmen are stationed along the touchlines. They signal when the ball is out of play and advise the referee about offside calls and other infractions.

Scoring

A goal is scored when the ball enters the goal and passes entirely over the end line. A goal is worth one point and may be scored by any player and from any place on the field. However, goals cannot be scored directly from an indirect kick, a throw-in, a goal kick or a kickoff.

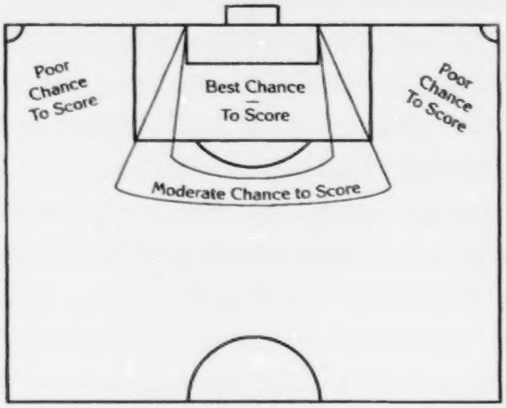
It is far more likely that a goal will be scored from the middle of the field than from areas near the touchlines because of the shooting angles involved. Therefore, attackers should attempt to pass or cross the ball into the middle of the field. On the other hand, defenders should try to clear the ball toward the touchlines (see Diagram 4).

Soccer is a low-scoring game where goals are at a premium. Therefore, attackers should try to capitalize on every realistic opportunity to score by shooting the ball. Although any kick may be used to score a goal, it is best to use the inside of the foot kick for shots close to the goal and the instep kick for shots from greater distances (10 yards or more). Goals can also be scored by heading the ball into the goal.

When you take a shot at the goal, kick the ball as far away from the goalkeeper and as close to the inside of the goalpost as possible. Also, try to shoot the ball on the ground because these shots are more difficult for the goalkeeper to reach than balls kicked into the air.

It is also a good strategy to look for teammates standing on the opposite side of the goal (far post). Very often these players are not marked because the defenders bunch around the player with the ball. This situation creates a great opportunity to score an easy goal. Last, be certain to follow each shot. Don't stand and watch your shot because shots frequently bounce off the crossbar, goalposts and other players (including the goalkeeper). When this occurs, alert offensive players have a golden opportunity to score goals.

Diagram 4. Scoring Opportunities from Different Parts of the Field



Tactics

Soccer's tactics are relatively simple to understand for two reasons. First, the objective of the offense is score goals and the objective of the defense is to prevent goals. Therefore, every tactical decision made by players should be based on how much it contributes to these objectives. Second, both the individual and team tactics used in soccer are very similar to those used in commonly played games such as basketball and hockey. Adapting these tactics to soccer is a straightforward process.

Many of the tactics described below are developed by the small-sided games and several of the drills (Create a Game and Keep Away) listed in the Practice for Improvement section. Once these tactics are understood, they can be readily applied to regulation soccer games.

Basic Tactical Concepts

1. Ball possession changes often in soccer. As soon as your team gains possession, every player starts to attack; as soon as you lose possession, everyone defends.
2. Whenever you have a chance to get the ball, go get it regardless of your location on the field or the position you play.

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3. Tactics cannot be implemented until you first learn the proper techniques for the basic skills of the game! Until such skills as dribbling, trapping, short passing, tackling, etc., are learned, no tactic will be consistently effective. It is particularly important that players learn to dribble without looking at the ball so they can see teammates and defenders.
4. Communication among teammates is essential to success. Learn to communicate effectively with your teammates while you are on the field.

Individual Tactics

When attacking:

1. Move to get the ball. This creates space between you and the defenders. And space is critical because it gives you more time to bring the ball under control.
2. Maintain possession. After you control the ball, maintain possession by shielding it from the defender. To shield the ball, place your body between the ball and the defender.
3. Create space. Stay away from teammates who have the ball. Instead, either sprint to an open area where you can receive a pass or to a supporting position 10-15 yards on the side or behind the dribbler.
4. Draw defenders to you, then pass. When one or more defenders approach you, pass to an open teammate instead of dribbling. Then run to an open area for a return pass (wall pass).
5. Don't hesitate to shoot. Goals are at a premium, so whenever you have a chance to score, take the shot (see section on Scoring for more details).

When defending:

1. Position yourself with your back to your own goal. Keep the attacker and the ball within your range of vision at all times.
2. Stay between your own goal and the attacker.
3. Know how to determine your marking distance. If the ball is close to your own goal, mark the attackers closely. If the attackers are very quick, give them more space, etc.
4. If a dribbler beats you, do not chase him or her. Retreat toward your own goal or mark another attacker while another defender marks the dribbler.
5. Contain the opponent's attack by channeling the dribbler to the touchline or to a teammate. This will allow your teammates time to retreat and set up a defense.

Team Tactics

(See Diagram 5)

When attacking:

1. If the ball is in the attacking third of the field, pass the ball into the middle of the field to take advantage of the best shooting angle (see Diagram 4). When the ball is in this area of the field, use individual skills, creativity, and improvisation to get shots at the goal.
2. Spread out to use the entire field. This will stretch the defense to create more passing lanes and scoring opportunities.
3. Move without the ball. Run to open areas to receive passes or to support teammates. Soccer is often called a "game of triangles" because the offensive team's players are frequently in positions that resemble triangles. For example, a dribbler should be supported on both sides and in the rear by teammates, thereby forming a triangle. The supporting players should be about 10-15 yards from the dribbler.
4. Use wall passes to advance the ball. The wall pass (give-go or triangle) is the most basic offensive play in soccer (see Diagram 6) and can be used in any area on the field. The play consists of the dribbler drawing a defender, passing the ball to an unmarked teammate, and then breaking behind the defender to receive a return pass.
5. Use both near post and far post attacks. A very effective method to attack the goal is to first advance the ball toward the near post. If this area is covered by the defense, then cross the ball to an unmarked teammate at the far post for an open shot (see Scoring section).

When defending:

1. If the ball is in the defensive third of the field, several tactics must be used to prevent goals: (1) clear the ball toward the touchlines, not up the middle of the field, (2) *never* pass the ball in front of your own goal, (3) avoid dribbling anywhere near the goal, and (4) closely mark the dribbler and any other players in the penalty area.

Diagram 5. Three Tactical Areas of the Field

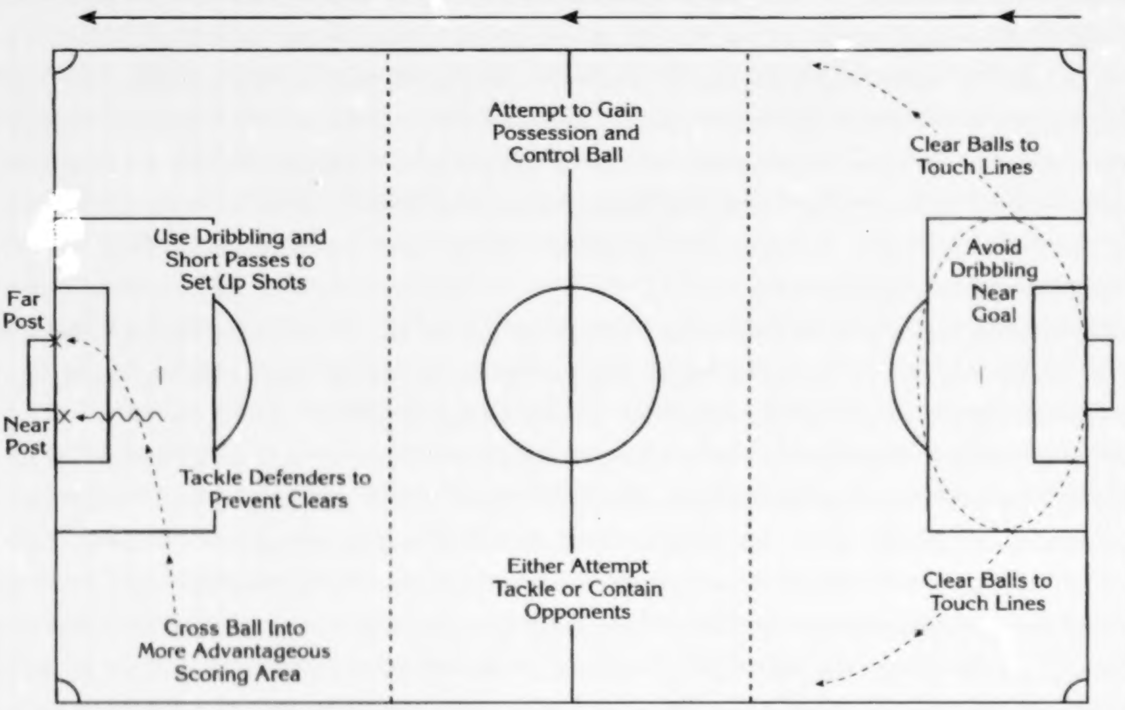
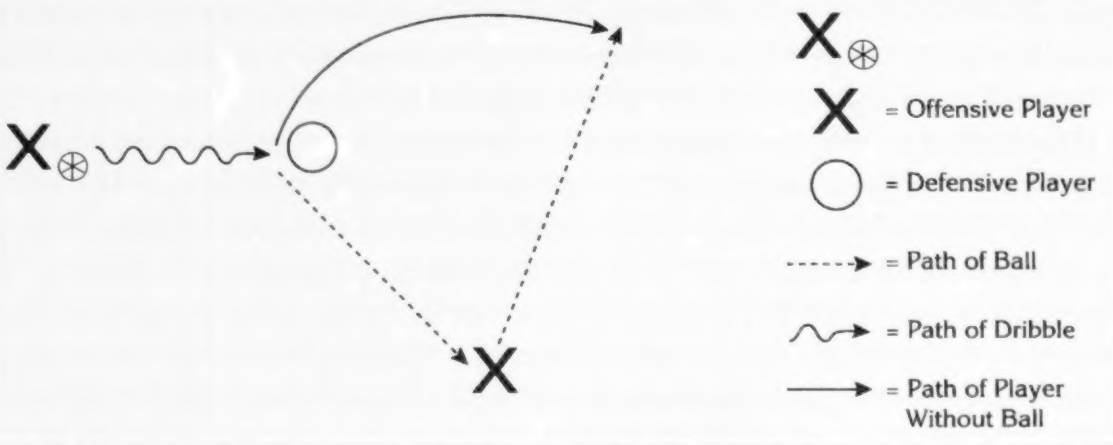

Attempt to Gain Possession and Control Ball
Clear Balls to Touch Lines
Use Dribbling and Short Passes to Set Up Shots
Avoid Dribbling Near Goal
Far Post
Near Post
Tackle Defenders to Prevent Clears
Either Attempt Tackle or Contain Opponents
Clear Balls to Touch Lines
Cross Ball Into More Advantageous Scoring Area

Diagram 6. Wall Pass (Give and Go)


X⊛
X = Offensive Player
○ = Defensive Player
= Path of Ball
= Path of Dribble
= Path of Player Without Ball

2. Protect the area in front of your own goal by "funneling" defenders into the center of the field.
3. Eliminate the attacking team's passing lanes by (1) closely marking dribblers to prevent them from making accurate passes, and (2) moving into the passing lanes to intercept the ball.
4. Players away from the ball should drop back toward their own goal and move toward the middle of the field.
5. If a dribbler approaches, the defensive player must decide to: (1) contain the dribbler while teammates recover to their defensive positions,

(2) force the dribbler to the touchline, or
(3) tackle the dribbler. A tackle should not be attempted unless a teammate is providing support or the dribbler is a threat to score.

Resources for Continued Participation

There are many opportunities to participate in soccer outside of class. Soccer is a very popular game that is increasingly played by members of both sexes and by people of different ages and ability levels. Playing soccer outside of school not only makes you a better player, it's fun and gives you a chance to be with friends and meet other people. Here are some suggested opportunities that may be available in your community.

1. **Interscholastic and Intramural Programs**. Your school may sponsor an interscholastic soccer team that plays games against other schools. These teams practice daily. However, you may have to "try out" for the team. Your school may also offer an intramural program for all students that is less competitive and demanding than interscholastic teams.
2. **Youth Sport Clubs and Organizations**. In many communities, private soccer clubs provide excellent opportunities for participation. These clubs generally sponsor teams for students of all ages. The teams may emphasize competition (frequent practices, traveling to many games, expensive participation fees, etc.) or may be more recreational (fewer practices and games, little or no travel, minimal fees, etc.). Be sure to decide which type of team you would like to participate on.
3. **Community-Sponsored Soccer Leagues**. Most communities have recreation departments that offer opportunities to participate in sports leagues for a minimal fee. Quite often, soccer is one of the sports offered. Generally, groups form their own teams and conduct their own practices. Games are usually played in the evenings or on the weekends. Organizations such as the YMCA, CYO, Kiwanis, Rotary, or Optimist Clubs also sponsor sports programs, and soccer is often one of the sports offered.
4. **Indoor Soccer Leagues**. Indoor soccer is a fast-moving and fun-filled version of soccer that is very popular. The playing dimensions are about 20x40 yards, and there is continuous action because the ball doesn't leave the field. There are usually five or six players on a team, including the goalkeeper.

For additional information about soccer, contact the following organizations:

American Youth Soccer Organization
5403 West 138th Street
Hawthorne, CA 90250
Phone (310) 643-6455
www.soccer.org

U.S. Soccer Federation
1801-1811 South Prairie Avenue
Chicago, IL 60616
Phone (312) 808-1301
www.ussoccer.com

United States Futsal Federation
P.O. Box 40077
Berkeley, CA 94704-4077
Phone (510) 836-8733
www.futsal.org

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CHAPTER 18

Softball

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Introduction

The game of softball, developed by George Hancock in 1887, was originally designed as a variation of baseball using a larger ball and smaller bat. The allure of the game was that it could be played by almost anyone—including those who were less skilled. Given that several versions of softball rules evolved after the game was first played, there was a move to standardize rules and equipment in 1933. The Amateur Softball Association (ASA) was founded in 1934 and still reigns today as the primary governing body for amateur softball in the United States.

From the early days of using a rolled-up boxing glove as a ball to the current version of the game, softball has enjoyed immense growth and popularity. Softball is played by millions of athletes in over 100 countries. In America, as many as 270,000 ASA-sponsored teams participate in fast and slow pitch softball programs, and new women's and men's professional leagues are emerging.

Given the popularity of the game and the need to stay current with a game that is constantly changing, the purpose of this chapter is to provide the middle and high school player with updated information about the fitness requirements, skills, drills, tactics, rules, and important terminology related to fast and slow pitch softball. Additionally, information about opportunities for continued participation is provided.

Terminology

Advance. To move from one base to the next.

Back Up. To move behind a player who is fielding the ball, in case the ball is missed.

Bag. A base.

Ball. A pitch that does not fall within the batter's strike zone.

Base Path. The area between the bases that is 6 feet wide. The center of this path is a direct line from base to base.

Batter's Box. The area near home plate where the hitter must stand while batting.

Battery. The pitcher and catcher.

Bunt. A ball that is contacted lightly with the intent of advancing runners onto base.

Cleanup. The fourth hitter in the batting order; typically a very effective hitter.

Diamond. The playing area, which technically is the area between the four bases.

Double. To hit the ball and advance through the bases to second base.

Double Play. A defensive play whereby two outs are obtained.

Error. To mishandle a ball or fail to obtain an out on a routine play.

Fair Ball. A batted ball that lands within the marked boundaries between the first and third base foul lines.

Force Out. An out that occurs because a player is forced to advance to the next base after the ball is hit.

Foul Ball. A batted ball that lands outside the marked boundaries between the first and third base foul lines.

Foul Tip. A batted ball that travels, no higher than the batter's head, directly back to (and is caught by) the catcher.

Full Count. When a batter has two strikes and three balls.

Inning. When teams play both offense and defense so that each team has 3 outs.

Lead Off. When a runner moves off the base to gain some ground or make the pitcher and catcher play attentively.

On Deck. The hitter who is prepared to hit next.

Shut Out. A game during which one team does not score.

Squeeze. To advance a runner from third to home on a bunt play.

Steal. To advance from one base to the next—without getting tagged—during the time the ball is pitched and caught.

Strike Zone. The area from which the ball can be successfully hit. This zone differs for fast and slow pitch softball. For fast pitch softball, the ball must fall above home plate between the hitter's knees and armpits. For slow pitch softball, the ball must fall above home plate and between the hitter's knees and his/her highest shoulder.

Triple. To hit the ball and advance through the bases to third base.

Wild Pitch. A ball that is pitched so high/low/wide that the catcher has no chance of controlling it.

Fitness Requirements

For the majority of players, softball is a game of short sprints. Outfielders sprint to retrieve well-hit balls, and hitters sprint around the bases. Therefore, most training for softball should revolve around conditioning the anaerobic system. Anaerobic activities do not require oxygen and are therefore difficult to maintain for a long period of time. Conditioning the anaerobic system will enable you to continue exercising when working at a very high intensity.

There are many different ways to train the anaerobic system, but among the best is sprinting. Because "you get what you train for," sprinting is a great way to improve softball ability. One of the best ways to determine your weaknesses relative to sprinting is to perform a "diagnostic" 120-yard sprint as recommended by Dintiman, Ward, and Tellez (1997). The 120-yard diagnostic sprint is divided into 3 sections of 40 yards each. The first 40 yards are called the *stationary 40*. Typically, this is the slowest part of a 120-yard sprint because it requires going from a starting position to full speed. The second 40 yards are called the *flying 40*. This segment of a 120-yard sprint is typically the fastest part of a 120-yard run.

You should train so your stationary 40 is within 0.7 seconds of your flying 40. The last 40 yards are called the *endurance 40*. If you are properly trained and can sprint well for the entire 120-yard distance, the time for the endurance 40 should be within 0.1 second of the flying 40. Dintiman and colleagues (1997) make several recommendations for improving each 40-yard segment.

Plyometrics, or exercises that enable a muscle to reach maximal strength in the shortest time possible, are highly recommended for increasing speed and quickness. The concept of plyometrics requires that you jump immediately again upon landing and use the elastic properties of the muscle to produce kinetic energy. Plyometrics are a high-intensity exercise that should not be performed by individuals 13 or younger, or those who cannot leg press 2.5 times their body weight. However, once you meet those criteria, plyometrics are a great way to increase speed and quickness. Some examples of plyometrics include jogging with high knees, butt kicks, double- and single-leg bounding, box jumping, and lateral bounding. These exercises can be safely done in 3 to 6 sets of 8 to 10 jumps with 1-2 minutes of rest between sets. Illustrations of several types of plyometric exercises can be found on page 9 of this book in the Physical Fitness Chapter.

Aside from sprinting and plyometrics, following are some other ways to improve quickness and sprinting ability:

- Jumping rope
- "Glove jumps," where you jump back and forth over your glove
- "Sprint squares," where you sprint on one side, shuffle or slide step on the next, backpedal on the third, and grapevine on the last
- Interval training, where you alternate jogging with sprinting. (As you improve your fitness, the length of the sprint can be lengthened and the length of the jog can be shortened.)
- Incorporating running with various skills in softball such as fielding and catching

In addition to the aforementioned training techniques, you should incorporate resistance training into your workout regimen. Strength training helps to prevent injuries and improve performance. Depending on your age and goals, position played, and any major muscular weaknesses, a resistance-training program should be developed to improve muscular endurance and/or muscular strength. Training programs are divided into repetitions and sets. A *repetition* occurs each time an exercise is performed. Repetitions are combined into *sets*, which are groups of repetitions.

If you want to develop *muscular endurance*, you should perform 10-15 repetitions of each exercise with little rest between sets. If you want to develop *muscular strength*, you should perform 4-8 repetitions with more rest between sets.

Although you may use different programs depending on your individual needs, you should perform 2 to 3 sets of 8 to 12 repetitions of the exercises recommended in Table 1. To allow for the muscles to rebuild after this type of workout, resistance-training exercises should be done every other day. Because of the risk of damaging bones that are still growing if you are under the age of 16, you should lift weights to improve muscular endurance (e.g., lighter weights and more repetitions). As you get older and more familiar with a variety of lifting techniques and programs, you may want to incorporate more resistance-training activities designed to improve muscular strength. Other tips for maximizing strength training results include the following:

- Seek the help of a qualified coach, athletic trainer, or personal trainer who can help you design an appropriate program.
- Vary the types and repetitions/sets of exercise you are doing. (This ensures that your muscles don't reach a plateau—where improvement will suffer.)
- Vary the intensity of your program (called "periodization") so that you work harder during the "off-season" and maintain your strength during the season.

Table 1. Recommendations for muscles to train for softball, and exercises that will train these muscles.

Muscle	Recommended Exercises
Abdominals (stomach)	Sit-Ups and Leg Raises
Biceps (front of upper arm)	Arm Curls
Deltoids (shoulders)	Shoulder Shrugs Dumbell Raisers
Forearms (lower arm)	Forearm Curls and Extensions
Gluteals (buttocks)	Squats and Lunges
Hamstrings (back of thigh)	Squats and Leg Curls
Lats (upper back)	Lat Pull-Down
Lower Back	Good Morning Exercise Hyperextensions
Pectorals (chest) Press	Bench Press and Incline Bench
Quadriceps (front of thigh) Extensions	Squats, Lunges, and Leg
Triceps (back of upper arm)	Lying Extensions Press-Downs Bench Dips or Dips
Hips	Squats & Lunges

You will find illustrations and more information about correct training techniques in the Weight Training chapter of this book (Chapter 26).

Because softball games can last for hours at a time, it is important for you to develop an aerobic base. A player with aerobic fitness can inhale oxygen through the lungs and deliver it to the working muscles at an adequate rate. A player with a good aerobic base will have the ability to continue to exercise for prolonged periods without tiring. A good running distance for developing aerobic fitness for softball is 1-2 miles. This distance can be completed in a reasonable amount of training time, and if you work to complete it in the shortest time possible, your aerobic fitness should improve. Pitchers, because they often pitch several innings in a row, may want to do additional training for aerobic fitness.

Skills and Drills

Prior to perfecting game strategies, it is essential for you to master the basic skills in softball. After all, you cannot execute a double play without knowing how to properly field and throw the ball. This section will focus on tips for practicing the basic skills in softball: catching, fielding, throwing, pitching, hitting (including bunting), and baserunning.

Catching and Fielding

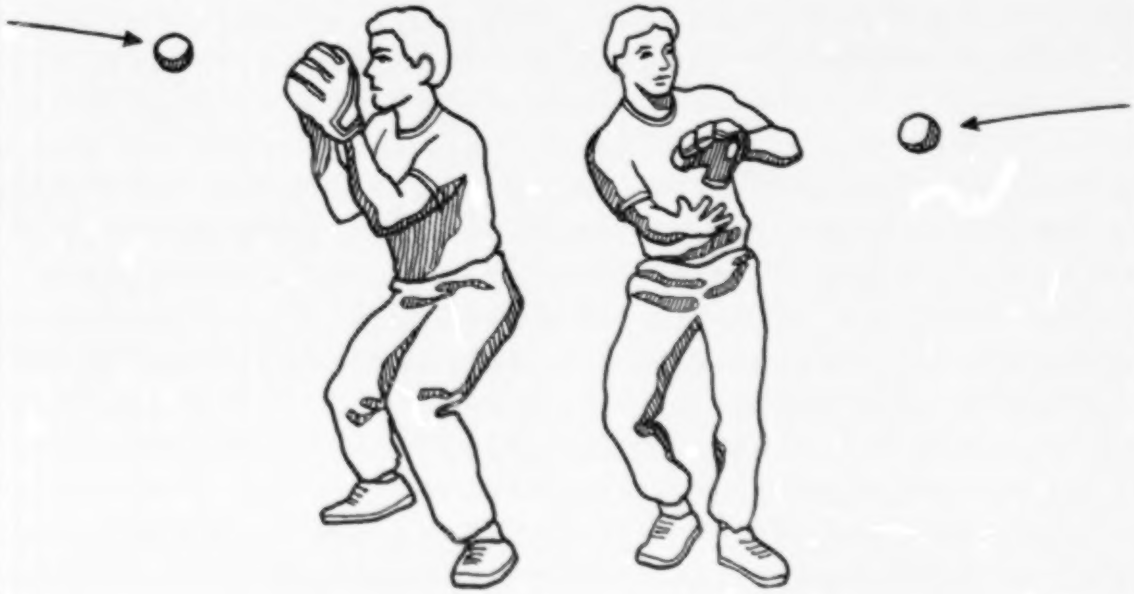
The first skill to learn in softball is catching. After all, if you cannot catch a ball, you cannot play or practice the game effectively. The most important skill for catching a fly ball is footwork, or moving your body into the path of the ball. Once your feet are in position, your arms and hands should reach and extend for the ball and "cushion" or "give" with the ball as it drops into the pocket of your glove. When catching fly balls, there are two ways to hold your glove hand. If the ball flies below your waist, your glove fingers should be pointed downward. If the ball flies above your waist, your glove fingers should be pointed upward. Figure 1 illustrates important mechanics of catching.

When you are fielding ground balls, the most important concepts to consider are moving your body into the path of the ball, anticipating a "catchable" hop, keeping your eyes on the ball, and keeping your knees bent and seat down. Your chin should be down as the ball approaches, and your eyes should follow the ball all the way into the glove. Weight should be mainly on the balls of your feet (to promote quick movement). Figure 2 presents proper form for fielding ground balls.

Drills for Practicing Catching and Fielding

1. *Wall Rebounding:* When you do not have a partner with whom to practice, a quick and simple way to practice fielding is to throw the ball against a wall. As you develop confidence with your fielding, the ball can be thrown harder and to the left and right of the target to facilitate quick reactions and footwork.
2. *Catch with Two Hands*: The purpose of this drill is to teach the importance of using two hands to catch. Using two hands to catch gives you a better shot at stopping the ball and ensures that you will be able to throw more quickly after stopping the ball. For this drill, players are divided into four equal groups and sent to first, second, third, and home base. Players at home and first are teammates, and those at second and third are teammates. At the coach's command, players at home and third (who each have a ball) throw accurately to their teammate at the other base. Once a player has thrown, that player moves to the end of the line. Players must catch the ball with two hands and release a quick throw back to the next person in line. The team that rotates through all players with successful throws is the winner. An alternative is to have teams count the number of successful catches and report this number to the coach at the end of play. This drill can also be performed while fielding ground balls (instead of catching throws). To enable more players to participate in the drill and/or to allow novice players to work with more experienced players to learn this skill, the drill can be performed so that experienced players perform the skills and novice players shadow them (approximately 12 feet behind).

Figure 1. Mechanics of Catching



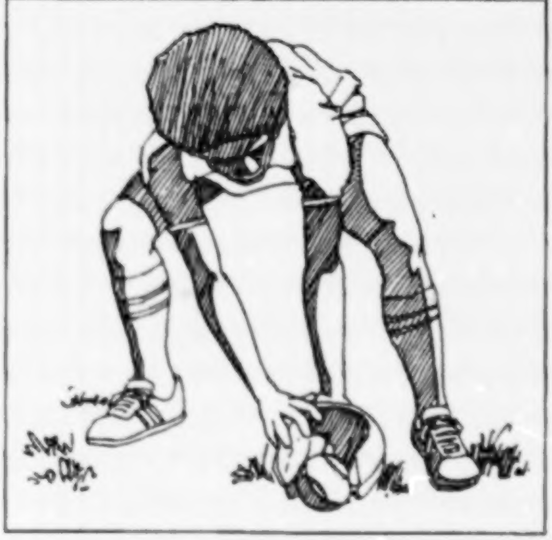
3. *Short Hop*: The purpose of this drill is to practice fielding short hops. Two players pair up and throw short hops to each another. Fielders should emphasize bent knees, watching the ball into the glove, and keeping the body behind the ball. As players develop more confidence, they should practice fielding balls hit by a batter from a variety of distances at a variety of speeds.
4. *Look At It Drill*: The purpose of this drill is to challenge you to keep your eyes on the ball. For this drill, you should use permanent markers or paint to draw stars, hearts, or other figures on several softballs. Coaches then hit ground balls and fly balls to players, who must call out the figure that appears on that particular softball.

Throwing

Throwing is another fundamental skill to the game of softball. Knowing and properly executing the fundamentals of throwing ensures accuracy and reduces the chance of injury. There are three basic throws in softball: overhand, sidearm, and underarm. Because the majority of throws in a game are overhand, most of this section will focus on tips for successfully throwing a softball using the overhand technique.

The overhand throw is best divided into four parts: grip, stance, delivery, and follow-through. To grip the ball, use a three- or four-finger grip, with the fingers spread evenly and the ball resting on the finger pads. The proper stance in softball requires you to stand sideways to the target (striding) with your glove hand reaching out and pointing at the target. Your throwing arm should be pulled back. To deliver the ball, your throwing arm should rotate around to a position where your pointing arm started. Your weight should be on your back foot initially and should transfer to your front foot as the ball is thrown.

Figure 2. Fielding a Ground Ball



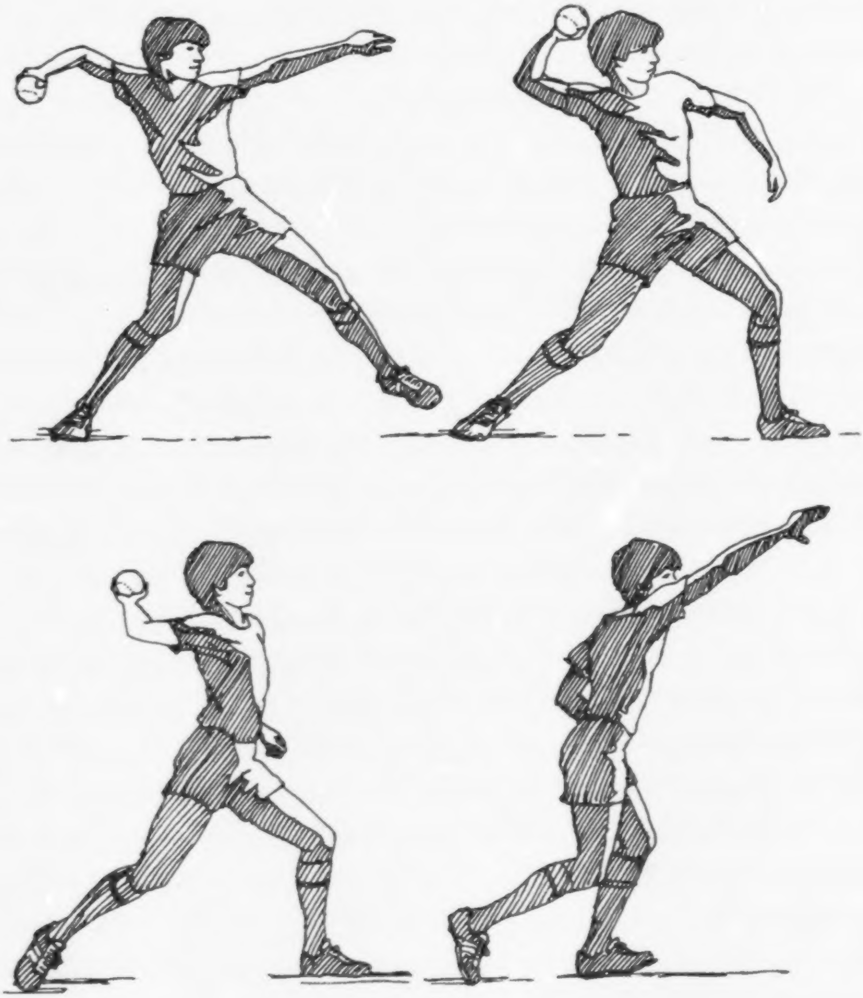
Concentration on a target is fundamental to throwing. When throwing, you should release the ball with a wrist snap and your fingers pointing toward the target. You should aim for the chest area. The follow-through is completed when your body weight shifts from your back foot to your front foot and your arm is in the direction of the intended target. When you are first learning the throw, emphasis should be placed on speed. Later, once the fundamentals of the throw can be performed, accuracy should be developed. Figure 3 portrays the proper overhand throwing mechanics.

In addition to overhand throwing, you will probably use a sidearm or underhand throw on occasion. The *sidearm* throw differs from the overhand throw in that your arm rotates around the side of your body (instead of overhead) and your palm faces your body (instead of the ground). The sidearm throw is used by infielders who need to throw the ball in a hurry. The *underhand* throw differs from both of the previous throws in that the arm rotates up and the palm faces up. The underhand throw is used when tossing the ball a short distance to a teammate. Specifically, an infielder (2nd base or shortstop) may retrieve a slow rolling ball and throw sidearm or underhand in an attempt to complete a double play.

Drills for Practicing Throwing

1. *Throw to a Wall Target:* This drill should be used to practice throwing when a partner is not available. The purpose of the drill is to work on throwing form and accuracy. A target, consisting of three concentric circles (or shaped like a human), should be placed on a sturdy wall. The center circle should measure two feet in diameter, the middle circle four feet, and the outer circle six feet. You should stand behind a line 40 to 65 feet away (this distance can be adjusted based on your skill level) and throw 10 balls at the target. Five points should be awarded for hitting the center circle, three points for hitting the middle circle, and one point for hitting the outer circle. You may try to increase your scores with each round of 10 balls thrown.

Figure 3. Overhead Throwing Pattern



2. *Increase the Distance:* This drill is designed for you to practice throwing the ball different distances. Using the target described above, mark off distances of 20, 30, 40, 50, and 60 feet. Move through the different distances and throw at the target for accuracy.

Pitching

Pitching is an important skill in softball that can dictate the outcome of a game. The style of pitching and the rules for pitching vary depending on whether the game is fast or slow pitch. Elite pitchers in the fast pitch game can throw the ball over 90 miles per hour. No matter which game is played, pitchers must know how to grip, release, control, and place the ball so it falls within the strike zone of home plate. Several types of pitches exist in fast pitch softball. These include the change up (a pitch that changes speed), rise ball (a pitch that breaks sharply upward), the drop ball (a pitch that drops sharply downward), and the windmill. This section will focus on important elements of windmill pitching in fast pitch softball. The windmill delivery in softball basically imitates the movement of the blades of a windmill as they systematically rotate around an axle. A fast pitch pitcher must imitate this circular motion to be successful.

There are three distinct phases that pitchers should practice to execute proper technique of the windmill pitch: preparation, execution, and follow-through. You should master one phase of the windmill pitch prior to proceeding to the next phase.

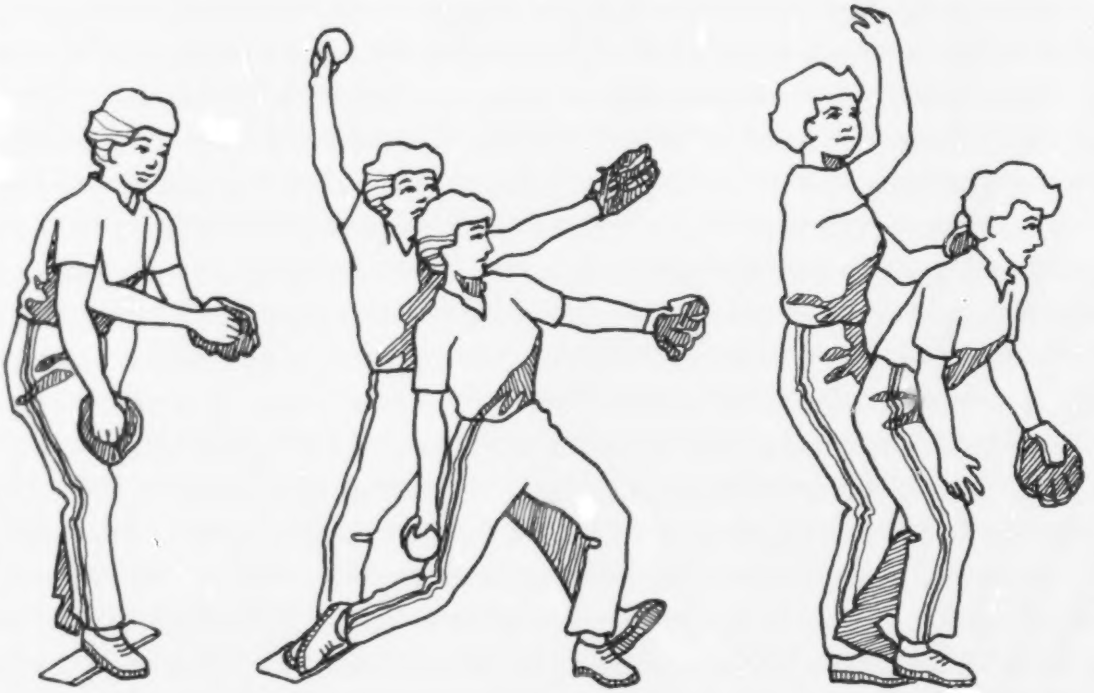
For the "preparation stage," you should start with both feet touching the pitching plate (rubber). Some pitchers dig a slight hole in front of the pitching rubber where the ball of the pivot foot contacts the ground. This allows the pivot foot to push off against the edge of the pitching rubber as the throw is delivered. Your weight should be on your back foot and your shoulders in line with first and third bases. Your hands should be forward, with your dominant hand holding the ball.

The "execution stage" occurs when your weight is shifted to your pivot foot. In this stage, your knees should be bent, and your hips and shoulders should be open. The pitch starts when your hands separate. For best results, your pitching arm should be fully extended and your hips and shoulders should move from open to closed. You must step directly at the hitter, plant your foot with the front leg, surge off your pivot foot, and release the ball by your thigh.

The third and final stage is called the "follow-through stage." For this stage, you should step forward with your pivot foot (which has to hit the ground within 24 inches of the rubber), and your hand should travel naturally above your head. Your wrist should snap upon releasing the ball. Your knees should be bent and displaying a square stance. Finally, in preparation for a hit ball, both hands should move immediately to the ready position. Figure 4 depicts proper motion for the windmill pitch.

Pitchers must possess exceptional fitness, concentration, control, confidence, and composure under pressure. To establish domination during a game, you should try to throw your most consistent pitches to the first batter faced, and you should always try to get the leadoff hitter out. You must maintain composure throughout the course of a game because you need to be emotionally steady from the first pitch until the last. Because you are constantly trying to disrupt a hitter's timing, varying the speed and type of pitch is essential.

Figure 4. The Windmill Pitch



Drills for Practicing Pitching

1. *Progression for Pitching (fast pitch):* Work with a catcher in the following progression: start on your knees, approximately 20 feet from a catcher, and throw the ball while working on the wrist snap. Next, start in the stride position and throw the ball by moving your arm around in a full circle. Lastly, move to the regulation distance and perform the full pitching motion. Work on speed and accuracy during these drills and always focus on a target.
2. *Wall Pitch (slow pitch):* For this drill, place marks on a wall 1, 6, and 12 feet from the floor. Place a pitching plate the regulation distance from the wall (usually 50 feet away). You should pitch the ball so that it arcs between the 6- and 12-foot lines and hits the wall between the floor and the 1-foot mark.
3. *Four Corners (fast pitch):* This drill is designed to help pitchers practice throwing the ball to the four corners of the plate (e.g., low inside corner, low outside corner, high inside corner, high outside corner) instead of directly over the middle of the plate. Catchers should start by having their pitchers pitch to the same spot 10 consecutive times. As pitchers increase their accuracy, catchers should mix up their targets.

Hitting

It has been noted that hitting is one of the most difficult sport skills. There are several different philosophies relative to hitting, and each one varies slightly depending on the type of hit desired. There are some fundamentals to hitting that should be learned and adapted to more complex styles once the basics have been mastered. First and foremost, hitting requires concentration, timing, and confidence. Proper bat selection is essential in order to be a successful hitter. The weight and length of the bat selected depends on the size and strength of the hitter. The goal of bat selection is to find the balance point at which the grip enables the swing to be smooth and comfortable. The components of hitting involve the grip, stance, and swing.

A right-handed hitter should place the left hand near the bottom of the bat and the right hand above the left. Hand positions should be reversed for a left-handed hitter. You should hold the bat with the fingertips, only tightly enough to control it. Batting gloves may be worn to help grip the bat, prevent blisters and calluses, and assist with the “swing” of the bat at the point of impact with the ball.

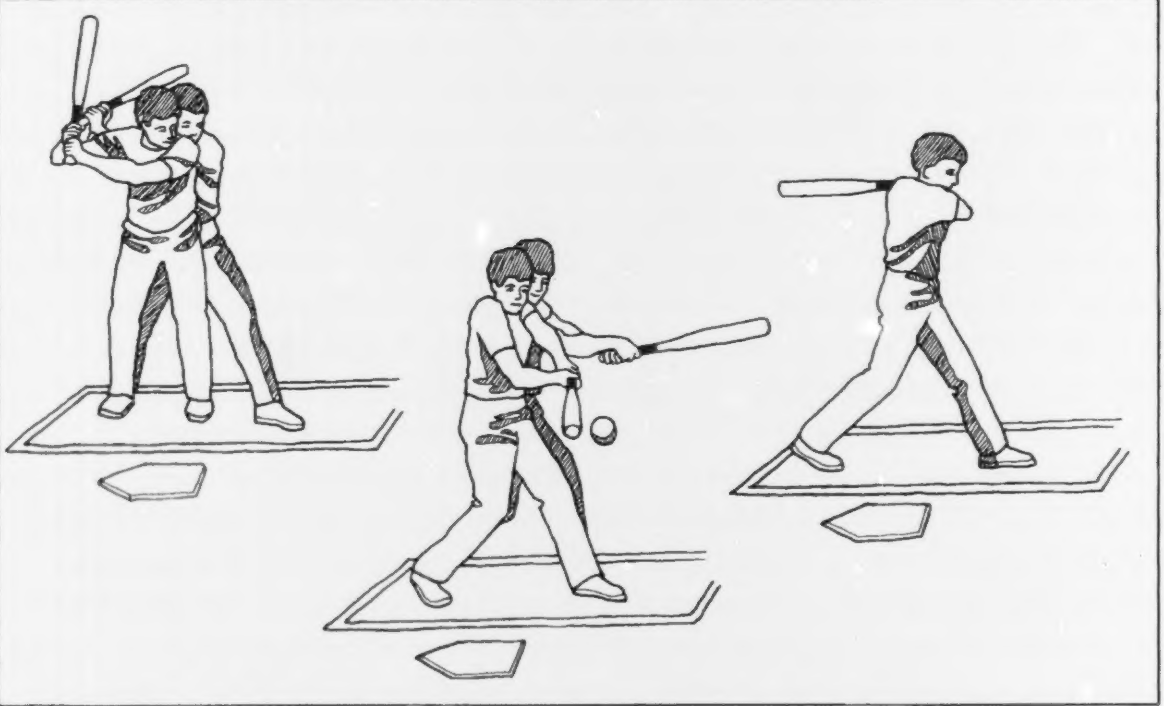
Stand close enough to home plate so that the bat can reach the outside corner. Your head should be turned toward the pitcher so oncoming pitches can be seen. The bat should be held near the top of the strike zone, and your arms should be held away from your body with the back elbow up. Your knees should be slightly bent and the feet shoulder width apart. A wide stance is usually preferred because this enables you to fake a short stride and allows you to maintain body control throughout the entire swing. “Keeping an eye on the ball” is essential to successful hitting. Your goal is to track the ball with your eyes until contact is made.

An important point to note, relative to hitting, is that the timing and mechanics of the swing differ slightly for fast and slow pitch softball. However, for overall effective hitting, the following steps should be followed. First, as you swing, pivot on the balls of the feet so your weight is evenly distributed. Your weight is naturally shifted from the back foot to the front foot to successfully drive the ball. For added power, some hitters add a small step forward (known as a stride). You should push off the back leg (“squish a bug”), open the front hip, and rotate the back hip so your stomach faces the field (Montelone & Crisfield, 1999). Hip power, weight transfer, and flexibility are important. The bat should be swung level, your front elbow should lead the swing, and your hands should be thrown first to move the ball. Your wrists should be rolled at the point of contact and rotated during the follow-through. Following through, with both hands remaining on the bat, is essential to successful hitting. Your chin should rest on your shoulder (facing forward) upon completion of the swing. Figure 5 presents important components of hitting.

Drills for Practicing Hitting

1. *Pepper:* Pepper is a great drill for developing hand-eye coordination and increasing ball control. A designated player hits to several players who stand about 20 feet away. This drill is designed to work on solid contact and placement by the batter. Once a fielder tosses to the batter (or a designated catcher), the batter takes a slight swing and the drill continues until each player has a chance to bat. A variation to this drill is to have the batter focus on hitting only ground balls. Then, if a batter hits a fly ball, the fielder who catches it takes the batter's place.

Figure 5. Components of Hitting



2. *Soft Toss*: Players pair up—one is the tosser and one is the hitter. The tosser (who is about five feet away from the hitter) throws an underhand ball to the hitter so that it falls in front of the hitter's lead foot in the strike zone. A variation to this drill is to have the hitter swing on one knee to emphasize the need to swing level (without an uppercut motion). For this drill, whiffle balls are ideal.
3. *Batting Tee Hitting*: To practice hitting the ball from a variety of heights, athletes should hit off of a batting tee. Hitters should practice hitting line drives in all directions from all heights using a batting tee. To minimize the time spent chasing balls that have been hit, other players should practice fielding during this time or the ball should be hit against a net or backstop.

Bunting

A hitting strategy that is unique to fast-pitch softball is bunting. A bunt is a very short hit produced when the batter holds the bat parallel (or slightly angled) to the ground and makes gentle contact with the ball. Bunts exist for a variety of situations, and the type of bunt executed varies according to foot placement and bat movement. When a team is trying to advance a runner to a more advantageous scoring position, a hitter may be asked to execute a *sacrifice bunt*. In this case, the hitter bunts the ball about 3 feet from the foul line and 15 feet from the plate—preferably near the first base line. The hitter then prepares to be thrown out at first base so teammates can advance to second or third base.

Some important fundamental information about bunting will be provided in this section. You should start in the normal batting stance for maximal deception. As soon as the pitch is released, pivot on the balls of your feet and square your shoulders toward the pitcher. As you pivot to face the pitcher, your top hand should move to the fat part of the barrel for increased control. Make sure that your hands are not wrapped around the bat or exposed to a pitch to ensure that you don't injure yourself. The bat should be held over the plate, parallel to the ground (or angled slightly up), and at the peak of the strike zone. As the ball approaches the plate, reach for the ball and pull the bat back upon contact to decrease the speed of the ball upon contact. The motion for bunting is similar to catching in that you should "give with the ball." Avoid lunging at the ball or swinging the bat. To avoid a pop-up bunt, hit only those

balls thrown in the strike zone. Figure 6 presents information about the mechanics of a sacrifice bunt.

In addition to the sacrifice bunt, a *push bunt* may be used to get the hitter on first base. In this situation, the batter tries to push the ball past the pitcher while keeping it short of the infielders. A good opportunity for using the push bunt is when the shortstop and second base player are playing deep.

The *drag bunt* is used by fast runners as a surprise tactic to get a base hit. In this case, the bunter waits until the last minute, drops the right foot back and bends the left knee. A chopping motion is used to send the ball to an appropriate area. It is important to wait until the last possible minute for this bunt so the defense is surprised.

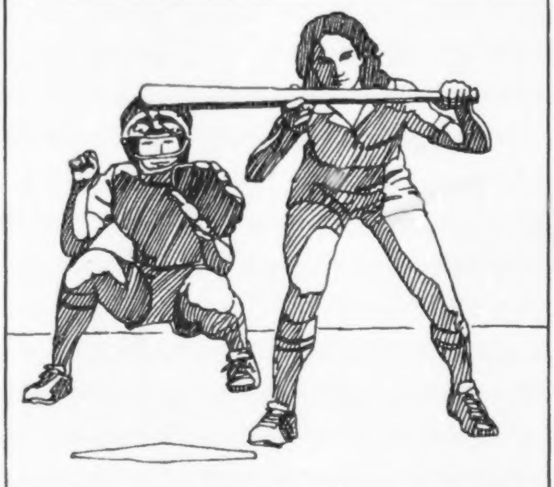
Drills for Practicing Bunting.

1. *Mirror Bunting*: For this drill, stand in front of a mirror with a bat. Imagine a pitch coming toward you and move to demonstrate ideal bunting form. Look in the mirror to see that you have mastered the fundamentals prior to taking any pitches. Repeat this drill until you demonstrate proper stance and form.
2. *Bull's-Eye Bunting*: The purpose of this drill is to bunt the ball at various targets set up along the first and third base lines. A variation to this drill is to award points for each target and see how many points you can score. In addition, points should be subtracted for foul bunts or bunts straight back at the pitcher.
3. *Small Group Bunting*: The purpose of this drill is to work together in small groups to practice bunt situations. For this drill, a pitcher, bunter, first base player, and third base player work together on reacting to various live bunts. Each bunter attempts 5-10 bunts toward the first and/or third base line, and all other players react to the bunts. Players take turns at all four positions.

Baserunning

Once you hit the ball, you undoubtedly want to run around as many bases as possible. Players who excel at running bases are often inherently quick. Additionally, they are adept at cutting down on angles and at using intelligence and instinct to anticipate opportunities (e.g., a bad pitch). A quality baserunner is alert and always knows the score, inning, and number of outs. Each game situation will differ and so will the strategy of baserunners.

Figure 6. Bunting



There are some common tips to help you become a better baserunner: (1) Run full speed on all ground balls (or when there are two outs)—no matter where the ball is hit, (2) Overrun first base so as not to slow your speed, (3) Watch the base coaches for advice (vs. turning your head to look at play), (4) Avoid "stutter-stepping" and wide turns as you round bases, (5) Tag up and prepare to run on all fly balls, and (6) Touch the base on the inside corner with the foot that comes up first.

Sliding, a technique that involves moving to a base feet first, is used to avoid being easily tagged by an opponent. If you run to a base standing, the opponent can tag you anywhere—from head to toes. If you slide, the opponent has a much smaller surface to tag, and the throw has to be low and on-target to be successful. It is important that young players practice sliding so as to avoid serious injury.

Drills for Practicing Baserunning

1. *Leave the Batter's Box*: The purpose of this drill is to practice leaving the batter's box and running full speed to first base. Start by demonstrating your regular batting stance in the batter's box. Then, using proper batting form, swing at 10 imaginary pitches and run to first base. The bat should be dropped in foul territory on the second or third step, and the batter should take full running strides toward first base.
2. *React to Base Coach*: The purpose of this drill is to practice watching for the instructions of

the base coach. Players should pair up so that one person is designated batter-baserunner and the other is a base coach. The batter-baserunner swings at an imaginary pitch and runs toward first. The coach indicates to the baserunner to either overrun the base or to specifically round the base. The cues are "round and look" or "overrun."

3. *Around the Bases*: The purpose of this drill is to have players practice running around the bases, making narrow turns and touching the inside corners of the bases. For best results, running speed around the bases should be timed.

Safety Concerns

Because softball players throw, catch, and hit a large ball travelling at top speed, there is potential for injury. However, if proper precautions are taken, injury risk can be minimized. First, check your equipment and field space regularly. Bats, gloves, bases, and catchers' equipment should be checked to ensure that they comply with the rules. Catchers' masks and chest protectors should fit properly. Bat grips should be minimally worn to prevent slippage. Aluminum bats should be single-unit construction. Bases should be collapsible so that individuals who slide will not be injured from colliding with a base. The playing field should be flat and free from hazards such as rocks, sprinkler heads, and other materials that can affect safety while running or fielding.

Prior to playing a game, make sure you warm up properly through stretching, jogging, and easy throwing. Taking the time to warm up prior to playing softball can prevent injuries due to sudden starts and stops and hard throws. Additionally, you should perform drills working in the same direction as your teammates—without looking directly into the sun.

Competition

Compared to baseball players, softball players use a larger/softer ball and lighter bats and play the game on a smaller field. In this section, additional information about the softball playing area, players, rules, and scoring is presented.

Playing Area

A softball game can take place on any flat surface. However, it is safer to use a grassy area than an area with a hard surface. A regulation softball field has a smooth dirt-covered infield and a grass-covered outfield. The *infield* is the diamond-shaped area in front of and slightly behind the base paths. The *outfield* consists of the area behind the infield. The minimum recommended distance from home plate to the outer limits of the outfield (ie, the fence) varies depending on the type of softball being played and the gender of the players. Specifically, the recommendations for minimum fence distance are 225 feet for males and females playing fast pitch softball, 250 feet for females playing slow pitch softball, and 275 feet for males playing slow pitch softball. Bases are typically 60 feet apart, although this distance may be increased to 65 feet for adults playing the slow pitch game. The distance between the pitching mound and home plate is typically 40 feet for women and 46 feet for men. To protect spectators and prevent excessive ball retrieving, a backstop should be placed at least 25 feet from home plate behind the catcher.

Players

In fast pitch softball, nine players take the field when their team is playing defense. These players include a pitcher and catcher, four infielders (first base, second base, third base, and shortstop), and three outfielders (left fielder, center fielder, and right fielder). In slow pitch softball, the same nine players take the field as in fast pitch softball, but an additional player is added. Depending on the hitting style of the opposing team, the extra player either joins the outfield or takes a position between the infield and outfield to prevent base hitting to that area.

Specific skills are required for each position. For example, pitchers in the fast pitch game typically have superior underhanded throwing speed and accuracy. Catchers can catch a variety of pitches and throw a runner out at any base. Infielders generally have above-average skills for fielding ground balls and hard-hit line drives, and they can catch balls thrown from a variety of angles (to get opponents out). Outfielders can generally run fast (to catch long balls) and throw hard and accurately (to throw runners out).

Rules and Scoring

Depending on the level of play and whether the game is fast or slow pitch softball, official rules are written by different governing bodies. For example, high schools play by the rules developed by the National Federation of State High Schools Association. Colleges play by the rules set forth by the National Collegiate Athletic Association (NCAA). Recreational players typically play by the rules of the Amateur Softball Association

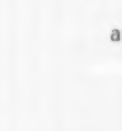
(ASA) or the United States Specialty Sports Association (USSSA). Because the majority of teams play using the rules of the ASA, this chapter will focus mostly on those rules.

Regardless of the set of rules followed, the game of softball is based on the concept that one team is on offense, trying to score runs (i.e., advance around the four bases without being tagged or thrown out), while the other team is on defense, trying to prevent runs from being scored. Members of the defensive team can prevent scoring by obtaining "outs." An out consists of (a) catching a batted ball on the fly, (b) tagging the runner with the ball, (c) causing the batter to swing three times without hitting the ball, or (d) holding the ball and touching the base ahead of a runner who must advance. Once the defense secures three outs, the teams switch sides and the team that was playing offense plays defense and vice versa. Each time both teams complete a batting cycle, this is called an inning. At the end of seven innings, the team that has scored the most runs is considered the winner of the game.

In addition to the basic rules described above, there are rules that are specific to the fast and slow pitch games. The main difference between fast and slow pitch softball is the speed and trajectory (arc) of the pitch. In fast pitch softball, to be effective, pitchers throw fast pitches that are parallel to the ground with very little arc. In slow pitch softball, to be effective, pitchers throw slower pitches with a larger arc.

Additional differences between the games are as follows:

- The distance between home plate and the outer limits of the outfield is greater for slow pitch than for fast pitch softball.
- At the beginning of a pitch in fast pitch softball, the pitcher must have both feet in contact with the pitcher's plate, whereas in slow pitch softball, the pitcher can have one foot in contact with the pitcher's plate.
- Base stealing is not allowed in the slow pitch game, whereas it is encouraged in the fast pitch game.
- In slow pitch play, the baserunner may not leave the base until the ball crosses home plate or has been hit by the batter. In fast pitch play, the baserunner can take a lead off of the base when the ball leaves the pitcher's hand.
- In slow pitch play, if a batter swings and a third strike is missed, the batter is out whether or not the ball is caught by the catcher. In fast pitch play, if the catcher drops the third strike, the batter may attempt to run to first base.
- In slow pitch play, if a batter hits a foul ball after two strikes, the batter is out. In fast pitch play, like baseball, a batter may continue to hit foul balls until she or he hits the ball, takes a third strike, or flies out.



In addition to learning the rule differences between fast and slow pitch softball, it is important to know some of the rules relevant to pitching, batting, and running bases. When pitching, the pitcher must start on the pitcher's plate (rubber) and present the ball in front of the body before pitching it. An underhanded motion must be used to pitch the ball, and the delivery motion may not involve more than one arm rotation. Additionally, the pitcher may not use a rocker motion (or change his/her motion) whereby both hands return to the ball prior to delivering the ball.

Some of the basic rules for batting are as follows. If a batter swings at a pitched ball and does not hit it, it is called a strike; three strikes equal an out. If a pitcher does not send a pitch to the strike zone of a batter, it is called a ball. If a batter gets four balls, the batter walks to first base. If the ball is hit so that it lands outside the playing field, it is called a foul ball.

When a player is running bases, several important rules apply. A baserunner can be called out in the following situations: (1) If the runner interferes with a player fielding a batted ball, (2) If the runner leaves an imaginary three-foot base path to avoid being tagged out, (3) If the runner is tagged with the ball while off a base, or (4) If two baserunners get caught on the same base.

Tactics

Once basic skills are mastered, attention should be shifted to mastering strategies to maximize offensive and defensive opportunities. For this section, offensive and defensive strategies will be discussed.

Offensive Strategies

Developing an offense in softball requires more than just swinging the bat. Successful teams make things happen by carefully considering their batting order and finding the opponents' weaknesses. Specific factors that may influence offensive tactics include the strengths and weaknesses of a pitcher and/or hitter, the location of runners on the bases, the inning, the score of the game, and the ball/strike count. Several offensive strategies such as bunting and baserunning have been covered earlier in this chapter. This section will focus on important hitting strategies.

Teams that cannot hit the ball cannot score runs. Therefore, major attention should be paid to practicing hitting techniques and tactics. One of the most important tactics in learning to hit the softball is learning to place the softball where the opponent is not standing. Hitters should survey the field to see where the holes are and aim for those holes when hitting.

Defensive Strategies

Defensive strategies are best implemented once you know the basic skills of the game. If implemented properly, the role of every defensive player may change with every pitch. Any breakdown at any position on defense (e.g., poor positioning, failure to back up a base, throwing to the wrong base) can result in a scoring extravaganza for the offensive team. Some specific defensive strategies that will be covered in this section are communication, defending against the bunt, fielding short hits that fall between the infield and outfield, pickoffs, rundowns, and cutoffs.

Perhaps the most important skill for a defensive team is communication. Communication can include calling for a ball that could be caught by any number of players nearby, or telling players where to go to catch or throw the ball. Time should be spent during practice working on communication.

For fast pitch softball, defensive teams should prepare to defend against the bunt any time there is a runner on base and fewer than two outs. Players have specific responsibilities while defending the bunt. For example, pitchers should pitch the ball high in the strike zone in an effort to make the batter pop the ball up. Additionally, they should be prepared to field a bunt. The first and third base players should move up to a position approximately halfway between the baseline and home plate. The second base player and shortstop must be prepared to cover their respective bases (first and second). All outfielders should also back up their respective bases. In all bunt situations, the main goal is to throw the lead runner out; however, if necessary, the ball can be thrown to first base. To save time when fielding a bunted ball, defenders should use the "shovel" or "scoop" technique, in which the glove is held closed so that it can push the ball into the throwing hand.

Another tricky situation for which defensive teams should prepare is when a short hit falls between the infield and outfield. This situation is difficult because the ball often falls between several players who could make a play on the ball. Unless players communicate (e.g., calling "mine" or "got it"), they could collide or miss the ball completely. Two general rules typically guide playing the ball in this situation. First, all players should aggressively pursue any ball—until called off by another player. Second, any ball that goes way over the heads of the infielders should be played by the outfielders because it is easier to run forward to catch a ball than to run backwards. Lastly, any ball that can be played by an infielder, without turning away from the infield, should be played by an infielder.

A *pickoff* occurs when a defensive player catches an offensive player off the base. The most important thing in making a pickoff work is that the infielder and catcher should signal each other that a throw will come to that base.

Another situation for which defensive teams should be prepared is the *rundown*. A rundown occurs when an offensive player gets caught between bases and two members of the defensive team are attempting to run that player down and tag him or her out. When runners are on first and third, the runner on first base will often purposely get caught in a rundown to give the runner at third base a chance to score. In a rundown situation, the objective of the defense should be to tag the runner out quickly, using the fewest number of throws possible. To accomplish this objective, the defensive player (tagger) with the ball should run hard at the baserunner. Ideally, the tagger can catch up to the baserunner and tag him or her. If the tagger cannot catch up to the baserunner, the tagger should run to within 20 feet of the base and pass the ball to a teammate who is waiting on the nearest base. The player on base receiving the ball from a teammate should make sure to call for the ball and not to stand in the line of the runner. A few other suggestions for directing a successful rundown: (1) Hold the ball by your ear to ensure a quick throw; (2) Stay on the same side of the base path as your teammate; and (3) Back up those involved in a rundown.

A final defensive strategy that should be practiced by teams is the use of *cutoffs*. A cutoff is used when a batter hits a ball deep into the outfield and the fielder cannot successfully throw the ball to home base (or any other place where a critical play is occurring). Given that scenario, the fielder typically throws the ball to the shortstop (or another designated infielder), who then can make a play in the designated area. Typically, the shortstop is the cutoff for balls hit to the left side of

Table 2. Website Information for Governing Bodies, Recreational Organizations, and Professional Softball Information.

Name of Organization	Information Provided	Website
Amateur Softball Association of America	National governing body of softball, responsible for • rules/regulations • safeguards • principles for ethical behavior • training coaches/umpires • selecting USA national team • local contacts & websites	www.softball.org
National Collegiate Athletic Association (NCAA)	Information about NCAA Collegiate Softball, including • college rankings • attendance • tournament information and brackets • records	www.ncaasoftball.com or www.ncaa.org
National Fast Pitch Coaches Association	Governing body for coaches that provides • college team rankings • scores • news	www.nfca.org
National Softball Association	Governing body for fast and slow pitch softball that provides • rules • tournament information • links • U.S. Parks • information about church, indoor, ethnic, senior, and youth softball leagues	www.nsa.softball.com
Softball Today	Online newsmagazine that provides • coverage of slow pitch softball in AZ, CA, NV, OR, UT	www.softballtoday.com
Softball Weekly	Weekly newsmagazine that provides • state by state games & results • tournaments • Team USA coverage • career opportunities	www.softballweekly.com
United States Professional Softball League (Men's Slow Pitch Softball)	Contains information about • league tryouts • conference and division alignment	www.uspsl.com
United States Specialty Sports Association	Major governing body for fast pitch softball that provides • rules • information about tournaments • information about leagues	www.usssa.com
Women's Professional Softball League (Women's Fast Pitch Softball)	Contains information about • teams • television schedule • statistics	www.prosoftball.com

second base, and the second base player is the cutoff for balls hit to the right side of second base. Cutoff players should always be backed up by teammates. Additionally, they should signal to outfielders where to throw and listen to the backup player for instructions as to where the next play should be made. Clearly, attention to offensive and defensive strategies in softball will lead to increased success.

Opportunities for Continued Participation

Several opportunities exist for continued participation in softball upon graduation from high school. If you are interested in playing recreational softball, check local newspapers and contact city recreational offices for opportunities for continued play. Additionally, the website for the Amateur Softball Association of America (www.softball.org) has information about local contacts and websites for recreational softball opportunities. For those desiring a higher level of play, 243 women's teams play collegiate softball at the NCAA Division I level alone. Additional opportunities exist for players at the NCAA Division II and III levels as well as at the NAIA level.

Professional fast pitch softball is currently available for women through the Women's Professional Softball League (WPSL). This league, which plays a 40-game schedule, debuted in 1997 with four teams located in Ohio and Florida (i.e., Akron Racers, Florida Wahoos, Ohio Pride, and Tampa Bay Fire Stix). Professional slow pitch softball for men will debut in 2002. This league, called the United States Professional Softball League (USPSL), will commence in April of 2002 with 24 teams divided into 6 divisions. For more information on softball governing bodies, recreational softball opportunities, and professional softball, refer to the resources listed in Table 2.

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CHAPTER 19

Swimming

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Introduction

Swimming and Diving: Life Saving and Lifestyle Skills that Can Make a Difference

Few sport activities offer the distinction of being able to increase health, prolong life, be used as a survival skill, and, at the same time, enable you to save another person's life. Swimming is capable of fulfilling all four challenges.

The development of skills in swimming and diving has the potential to open a multitude of new horizons to secondary school students, leading them into the vast world of aquatic recreation, instruction, and competition, and to a degree of wellness that will enhance and extend human life.

Because vacations and summer camp experiences are often centered around aquatic activities, good swimming skills are essential to safe experiences and maximum fun. Swimming also provides access to the exciting recreational activities of skin and scuba diving, water skiing, sailing, canoeing, windsurfing, and parasailing.

For those students who develop their swimming skills to more proficient levels, the opportunity exists to obtain certification as a lifeguard or as a swimming instructor, which can lead to the satisfaction of teaching someone to swim or the rewards of working with the disabled and other special population groups. Certification can lead to a summer aquatic job as a lifeguard or swimming instructor and eventually to a career in coaching, teaching, administration, or facility management. Some students will be able to elevate their skills and abilities to even higher levels in competitive aquatic sports. Many schools provide competition for young men and women in swimming, diving, water polo, and synchronized swimming. These sports can provide recognition for students and their schools and can provide a sense of pride for the entire community. Outstanding athletes also enjoy the possibility of earning college scholarships.

Swimming is a form of life insurance because it is a fitness activity that enhances individual wellness. Four workouts a week for 30-45 minutes can improve circulation and respiration and lower cholesterol, triglycerides, and blood sugar. Five to six workouts a week can significantly reduce fat tissue and increase muscle mass. Few exercise activities offer so much benefit from a low-impact aerobic workout.

Aquatic Terminology

Each sport has a vocabulary that is specific to the skills and techniques used in the activity. The following terms will assist the reader in understanding the vocabulary of swimming and diving.

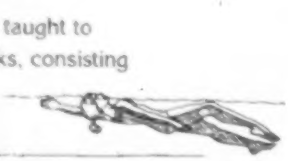
Swimming and Diving Terminology

Buoyancy. A characteristic of water that holds a person up. Individual buoyancy is largely dependent on one's body type.

Dive. A headfirst entry into the water with the arms outstretched in front of the head and legs extended straight and together. One should never dive into less than 9 feet of water.

Inhale and Exhale. For swimmers, it means breathing in through the mouth and out through the nose and mouth.

Finning. A basic form of propulsion taught to beginning swimmers while on their backs, consisting



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of moving the arms similar to a bird moving its wings, pushing water toward the feet.

Float. Maintaining a motionless position, face up or down on the surface of the water, while holding your breath.

Glide. To move through the water with the body fully extended after a dive or push off or following the arm stroke or kick in a resting stroke, e.g., breaststroke, sidestroke, etc.

Jump. A feet-first entry from poolside or from a springboard, with the body straight, legs straight, and arms held across the chest or at the sides. One should not jump into less than 5 feet of water.

Level Off. A return to the horizontal position at the surface following a jump or dive into the water.

Recovery of the Arms. Moving the arms over or through the water following the pull/push action of a swimming stroke and back into position to pull and push again.

Recovery of the Legs. Moving the legs back into position for another kick following a kicking action.

Rhythmic Breathing. Inhaling and exhaling in a rhythmic pattern, primarily synchronized to the movement of the arm in a swimming stroke.

Sculling. An elementary form of wrist and hand movement designed for propulsion through water or to support the body at the surface.

Surface Dive. The technique of swimming at the surface and making a dive toward the bottom.

Tread Water. A combination of hand/arm movements, along with a kick, designed to keep a person at the surface in the vertical position with minimum movement.

Competitive Swimming Terminology

Butterfly Stroke. A competitive stroke utilizing a double-arm overwater recovery and a dolphin or fish tail kick.

Flip Turn. A somersault turn used by freestylers and backstrokers in competitive swimming races.

Freestyle. Refers to competitive swimming events where swimmers have a choice of what stroke they want to use (usually the American crawl because it is the fastest of all swimming strokes.)

Freestyle Relay. A competitive event requiring four people to take turns swimming the same distance one after the other. In a freestyle relay, each competitor can choose their stroke (usually the American crawl).

I.M. (Individual Medley). A competitive event of 200 yards (4 x 50-yard segments) in which each contestant swims two lengths each of butterfly, breaststroke, or freestyle (any stroke other than the first three, usually American crawl).

Fitness Requirements

The fitness requirements for students who desire to learn how to swim are very minimal; however, initially the psychological adaptations to swimming can be a problem for some students. Swimming requires an adjustment from everyday life in the upright position to movement in the horizontal position—while breathing in a pattern or rhythm, usually with the face in the water for part of the time.

One of the fitness requirements of swimming involves buoyancy, which helps a person to remain at the surface with little or no effort. The ability to stay at the surface depends entirely on body type. Heavy persons and those of medium build generally are buoyant. Persons who are lean or thin have difficulty with buoyancy. Therefore, a modest amount of strength is required when thin people learn to swim in order to overcome the lack of buoyancy. Strength will also be an asset to nonfloating beginners until they learn to relax in the water.

A second requirement is coordination because swimming requires simultaneous movement of the arms and legs while breathing in a rhythmic pattern. One of the benefits of learning to swim is an increase in coordination as students develop their skills and endurance. Endurance is also a factor in swimming because of the density of water as compared to air. Although swimming initially requires some endurance, one of the benefits of swimming is the development of increased endurance.

One of the advantages of swimming is that anyone can learn, even those people with disabilities. Swimming promotes endurance, builds strength, and develops coordination. In addition, participation in swimming as a regular form of exercise eliminates the weight-bearing stress of land activities and is one of the sports activities that asthmatics can participate in because the environment is, for the most part, free of dust. Swimming is also great for weight reduction, body toning, and developing the body symmetrically while increasing flexibility.

Increasing Student Learning Potential

Swimming instruction can be a stressful experience for students who have not spent much time around the aquatic environment and for beginners with coordination problems. There are a number of significant differences with which a student must cope when learning skills in the water, as compared with learning skills on land. Factors that inhibit learning in water include the following:

1. *Sensitivity to water pressure.* Some beginners will display uneasiness when standing in chest-deep water, characterized by labored breathing and an increase in respirations. Students will normally adjust to water pressure discomfort naturally in a short period of time.
2. *Balance.* In the early stages of learning basic skills such as floating and gliding, some students will experience difficulty in regaining their balance when attempting to stand up. Before attempting a prone glide or a facedown floating position, tuck your legs under your body and then press down with both legs. The tuck should occur simultaneously while pushing down with the hands prior to lifting your face from the water.
3. *Vision.* Vision is distorted and images are blurred when the eyes are open in the water. Moderate levels of chloramines (.3-.9 ppm) will irritate the eyes. These visual changes and discomforts initially may slow the learning process but will eventually be accepted as a normal part of the environment.

   Learn to open your eyes occasionally when swimming in a prone position to prevent injury that may occur from swimming into a wall or another person. Goggles will enhance visual capabilities, but should only be worn while swimming on the surface of the water. Severe damage to the eyes can occur if one swims underwater at depths greater than four feet while wearing goggles, as external water pressure will cause squeeze. There is no way to equalize this pressure in the goggles unlike there is when wearing a face mask.
4. *Hearing.* Most swimming skills require a horizontal body position, which allows the outer ears to fill with water, disrupting communication between teacher and student.
5. *Breathing.* The simple act of breathing can be one of the most frustrating and difficult skills to master for the beginner. Unlike breathing on land, which can be accomplished at any time, swimmers face drastic changes. In order to get enough air to satisfy the body's demand, inhalation must occur through the mouth and exhalation should occur through the nose or mouth and nose. In addition, breathing often must be coordinated with an arm stroke in a rhythmical fashion, as with the American crawl stroke. Beginners soon learn to accept the fact that they must time their breathing and that their inhalations may be accompanied by water.
6. *Buoyancy.* The ability to float enhances learning and increases confidence in one's ability to master swimming and aquatic skills. Those students who are negatively buoyant are at a slight disadvantage. As a result, the teacher may eliminate water orientation skills such as the turtle and jellyfish floats for nonbuoyant students.
7. *Body position.* Adjusting to movement of the body in a horizontal position is a unique experience in swimming that requires some time. The teacher must recognize that beginners have adapted to their land environment using an upright posture. With few exceptions, all external stimuli in swimming are interpreted from the horizontal position. Adaptation to this change in orientation will take place gradually and can be accelerated by increasing the number and length of practice sessions.
8. *Propulsion.* Also unique to swimming is a change in the primary source of propulsion. On land, we move using our legs to walk or run. In swimming, the arms serve as the primary source of propulsion.
9. *Resistance.* Because the medium of water is denser than air, resistance to movement is quickly noticed in the water. Resistance, along with unrefined swimming skill and water temperature below 82 degrees F, can cause fatigue and may have some bearing on the length of class or practice time.
10. *Fear.* Fear and embarrassment are also factors that can significantly hinder the learning process. Some students will come to class with fears, real or perceived, based on personal experience or the experiences of others. In addition, the embarrassment of learning to swim as a teenager can be an inhibiting factor.

These ten factors are important considerations in learning to swim. Analysis of the factors shows that the beginning learner will be placed in an environment

where there is some amount of sensory deprivation, as significant changes occur in vision and hearing. When these sensory changes are combined with fear and the principles of buoyancy, resistance, and propulsion, the swimming pool becomes a truly unique and different world. These extreme differences indicate a need for careful progression and for patience as you and your classmates make sometimes difficult psychological adjustments.

Confidence and Adjustment Skills

Developing Basic Skills

For those students who want to learn swimming and water safety, the National Association for Sport and Physical Education (NASPE) and the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) recommend enrolling in a basic level swimming class. Basic classes are part of many high school curricula or after-school, community swim programs sponsored by progressive school districts. These classes should always be conducted with a certified lifeguard on duty during class. If your school or school district does not have a swimming pool or an aquatic program, NASPE recommends that you contact your local YMCA or American Red Cross chapter to identify introductory courses that they are offering. In either situation, it is very important that you learn to swim and develop proficiency in your ability to swim and dive safely.

To best prepare for what you will be learning, read the following information carefully.

Entering the Water

Feet first, first time, is a good rule to remember when entering a pool or any body of water for the first time. For beginners, the safest way to enter shallow water is to sit down at poolside with their legs in the water and ease in, feet first, or use the pool ladder. At no time should beginners dive or jump into the pool at the shallow end. When diving and jumping entries are taught or practiced, always be sure there is at least 9 feet of water.

To ease in, sit on the side or coping with your legs in the water. Place both hands on the deck at one side of your body. Transfer your weight to your hands while turning 180 degrees and then slowly lower yourself into the pool while maintaining your hold on the side of the pool.

Control of Breathing

The first water adjustment skill for beginners should involve breathing. Inhale through the mouth and hold the breath and when exhaling, do so by exhaling through the mouth or nose and mouth. After several successful attempts at breath holding with your face in the water and while holding on to the poolside, bobbing can be introduced.

Bobbing is a breathing skill practiced in chest-deep water. Take a breath, flex at the knees, and slowly submerge below the surface. Exhale slowly through the mouth and then return to a standing position. Practice this technique until the skill can be repeated 20 times consecutively in a comfortable manner.

Floating

Floating means achieving balance in the water without movement. It does not mean that you must lie on your back with your toes out of the water. Floating can best be accomplished in the prone position, tucked up in a ball (tuck float), or with the arms and legs down (jellyfish). One does not have to be able to float to be a good swimmer, but it helps your confidence to know that you can rest in the water without effort. Almost everyone can float facedown in the jellyfish position. Recover to a standing position by tucking your legs underneath your body while pressing down with your hands before lifting your head.

The facedown position can be experimented with once you have confidence in your breath holding and position recovery. To float on your back, stand low in the water (up to your chin), lay your head back gently, and lean back until your feet leave the bottom. Keep your shoulders back and chest up and lean back until your feet leave the bottom. Hold your arms in a "Y" position in the water behind your head while holding your breath. Holding your breath is essential to floating.

Forward Glide

The next step is to practice two skills previously learned: taking a breath and putting your face in the water while stretching out with your face submerged. This skill should also be practiced by pushing against a pool wall, beginning from a standing position and with your back to the wall. One foot should be placed against the wall, while your arms are extended in front of your body prior to pushing off. Push off and glide. Recover to a standing position as if recovering from a prone floating position.

Back Glide

Begin this skill as if it were a back float. The arms should be kept at your sides while pushing off from the bottom or the wall. When movement stops, your legs will begin to sink. Reach forward with your arms and face forward in the water. When your feet are under your body, you should be able to stand up by pulling your hands back along the surface.

Kicking and Finning

Movement can be sustained in a back glide with an easy up and down movement of the feet strong enough to break the surface. The body position is flat in the water. Propulsion from the hands and arms is accomplished by pushing water toward the feet. The arms begin at the sides with the elbows bent and the hands up close to the body, fingers pointing toward the feet. With the fingers pointed outward, the arms reach out and push down to the sides. The arms then pause for a short rest at the sides. This arm movement is called finning (see Figure 1).

Sculling

A more advanced form of hand-arm propulsion is called sculling. In this skill, instead of sliding the hands close to the body, the arms are held straight along the sides. The hands are turned over so that the thumbs are pointed toward the bottom and the hands are pushed out slightly away from the body. Then rotate the thumbs upward and pull back to the sides. During this action, the wrists are extended and firm, the fingers are held together so that the hand is flat, and the elbows are relaxed. Sculling is more propulsive than finning because there is no recovery, only a quick turning of the hands.

With finning or sculling while kicking on the back, a lot of distance can be covered. These skills are easy to master and, because of their simplicity and low energy expenditures, are very useful in an emergency.

Elementary Backstroke

The elementary backstroke is an excellent progression step from finning and sculling. It is a stroke performed on the back that features an extended glide and is referred to as a resting stroke. The arms and legs move at the same time, below the water's surface. Strokes should be long and easy, and usually there is no special breathing technique to learn for buoyant swimmers because the face is out of the water at all times. Nonbuoyant swimmers, however, can hold their breath for a short period of time during the glide, which will help to maximize the distance achieved.

Arms

The arms are recovered close to the body and move up to the shoulders. Then they are extended out and pulled just under the surface back to the sides. The pull may be done with the forearms fairly close to the body or by straightening the arms a little while behind the head,

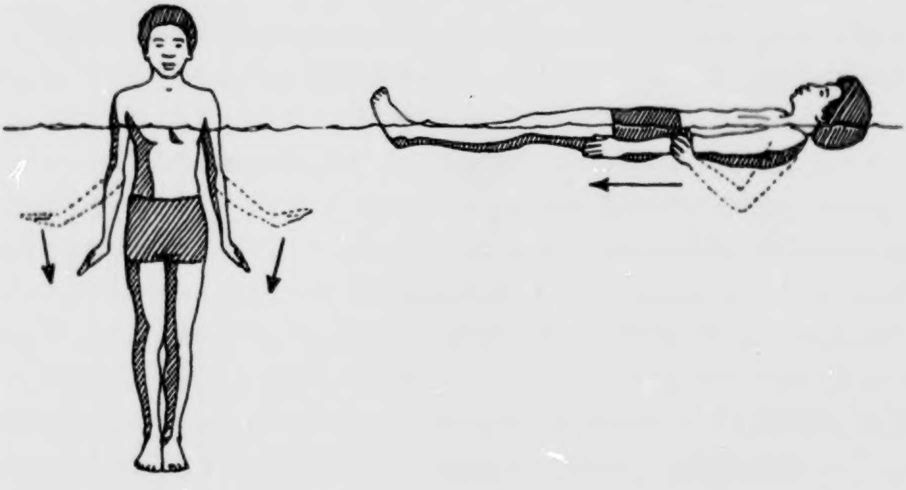


Figure 1. Finning

Figure 2. The Elementary Backstroke

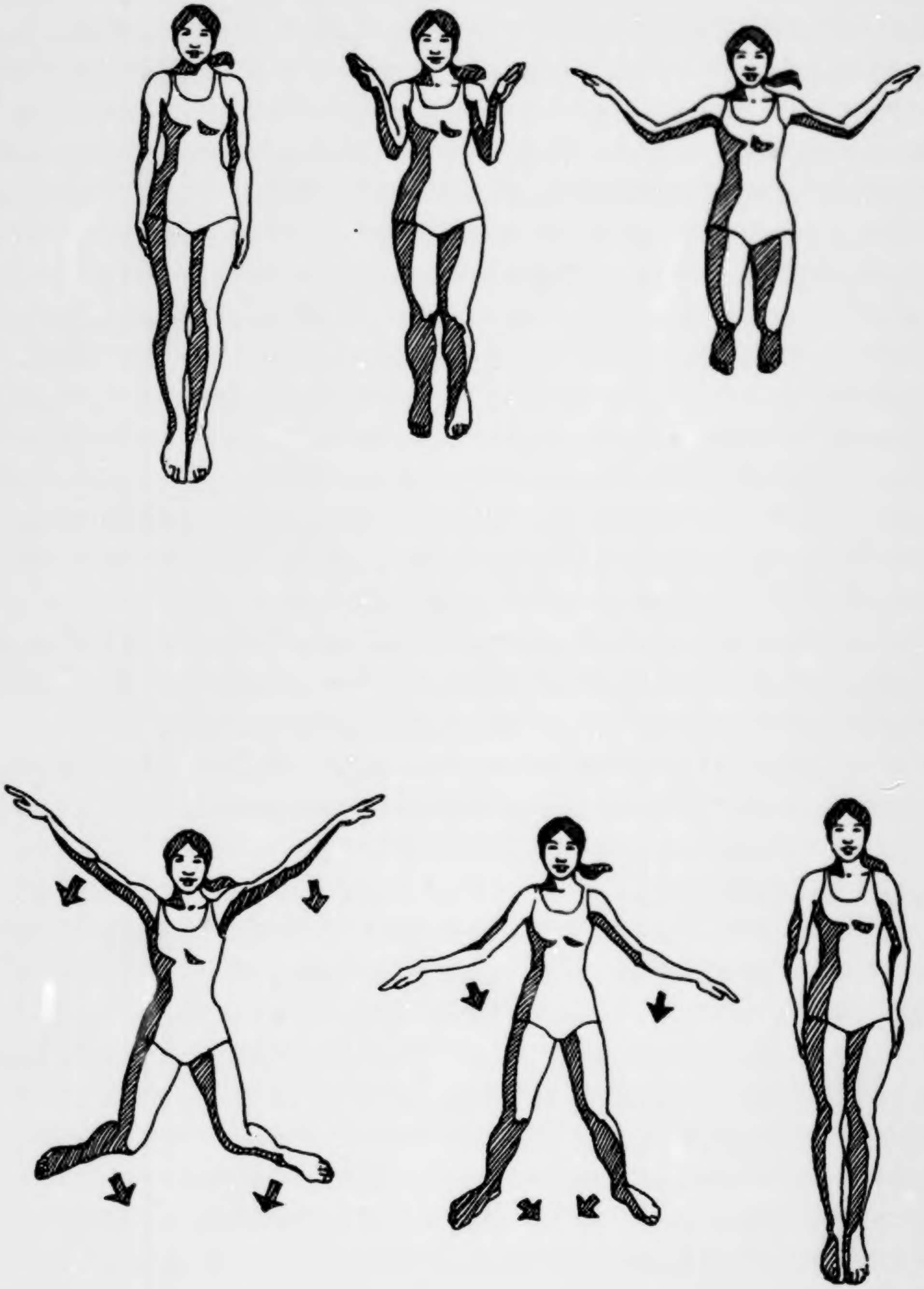
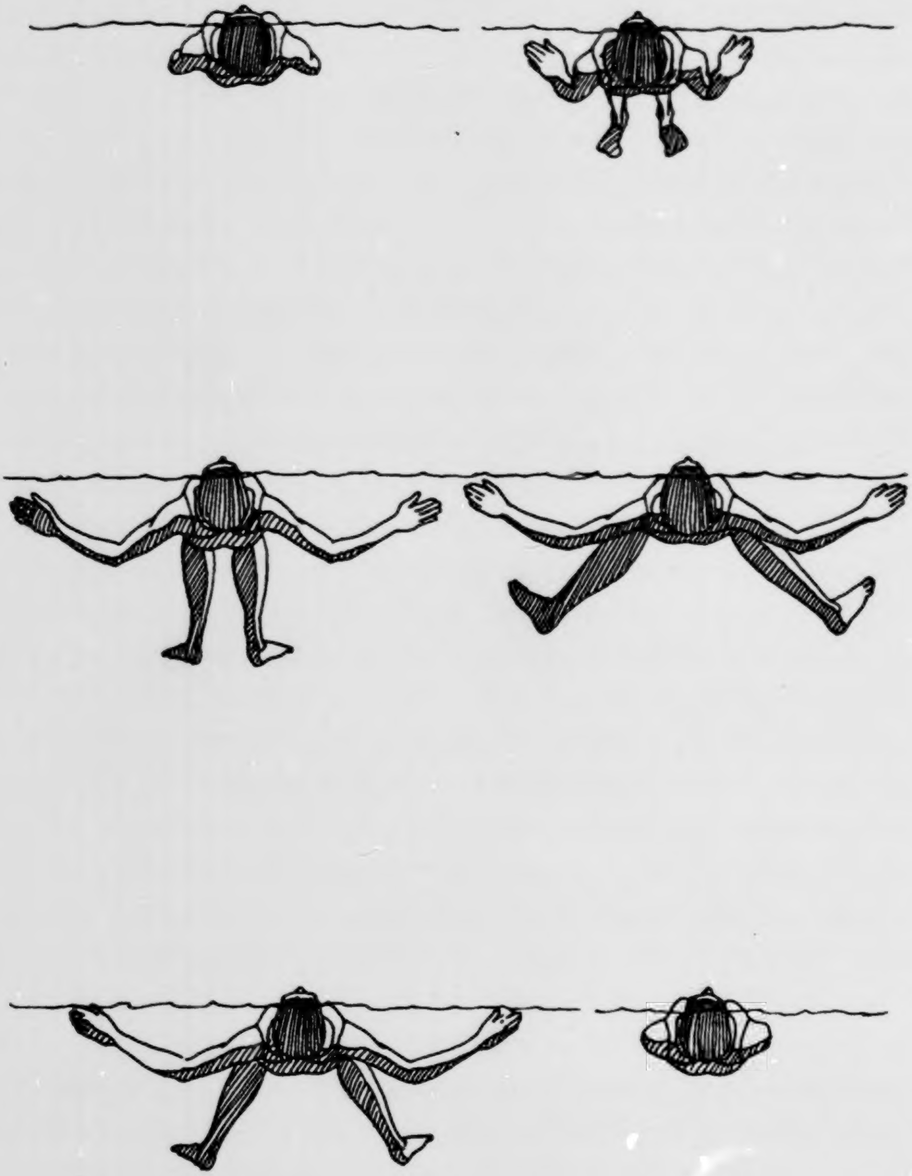


Figure 2. The Elementary Backstroke (continued)



then sweeping out and down. The initial movement of the arms begins with the hands close to the body, moving up in a slow and easy recovery. The recovery is followed by a strong pull or sweep toward the feet, and the resulting glide is held until the legs begin to sink.

Kick

When learning the kick, glide on your back and bend your knees, dropping your feet below the knees. There should be no turning out (pointing the knees outward). Throughout the entire leg movement, the knees should be three or four inches apart and parallel to each other. The hips must be kept up to avoid a sitting position. The soles of the feet are pressed back and a little to the side in a circling motion that causes the knees to spread apart a little more. Continue pressing with the feet as the legs are straightened and the feet brought together. Emphasize holding the glide at the finish of each stroke.

Arms and legs bend and move easily in their first actions; then both are pushed back simultaneously in the direction of the feet and finish together. As the strokes improve, start the arm recovery slightly before the leg recovery and then push at the same time with both arms and legs into the glide. Figure 2 illustrates the movement pattern and sequence of the elementary backstroke.

Intermediate Level Swimming Skills

Intermediate swimmers should learn to perform five basic strokes reasonably well: the elementary backstroke, backstroke, crawl stroke, breaststroke, and sidestroke. Swimmers will feel confident in deep water and should be able to swim longer distances after learning these strokes.

Backstroke (Back Crawl)

The simplest of the intermediate strokes is the backstroke, sometimes called the back crawl. It is similar to the crawl stroke but performed while lying on the back. The body position is flat on the water, and the legs move up and down in a flutter kick. Arms alternate in pulling the water from overhead to the sides of the body and are recovered over the water to their starting position beyond the head. Figure 3 shows the sequence of movements involved in the backstroke.

Kick

The legs move down past each other so that there are about 12 inches between the foot breaking the surface and the one below. In the movement of each leg, the knees bend a little to finish the downward movement of the foot and then straighten up on the way back to the surface. The feet are relaxed on the down kick and extended on the upward kick. This extension of each foot is mostly a passive action because it occurs due to pressure on the instep. The knees should not break the surface; the hips should stay as close to the surface as possible throughout. Kick timing is steady and continuous, with more force applied in the upward direction than in the downward.

Arms

The arms move in opposition to each other; one pushes water from the overhead position to the side while the other recovers above the water to return to the overhead position. The recovery arm is placed overhead on the water with the little finger contacting the water first (palm turned outward). The hand drops beneath the surface and presses back to begin a push. The arm should drop underwater 8-12 inches and then begin moving strongly. Ideally, the elbow bends to about 90 degrees as the hand pushes past the shoulder. The forearm then moves rapidly to a finish at the side with the arm straight. A slight body roll occurs toward the side of the pushing arm. This will make the push stronger and help the recovering arm clear the water on the other side. The recovery is an easy lift of the whole arm, straight but not tense, up and back. It drops easily into the water again in line with the shoulder and behind the head.

Arm actions are continuous, one arm always exactly opposite the other. Attention to this oppositional timing—that is, never letting one arm begin to "catch up" with the other—creates a cross-balance of power from one arm to the other and makes a smooth backstroke. The rapidity of kicking depends upon the individual swimmer. Most swimmers average about three kicks per arm push.

Crawl Stroke

The crawl or American crawl, sometimes called the freestyle, is the fastest of all strokes. It utilizes a flutter kick, an alternating arm movement, and a rotary style of breathing with the body in a prone position.

Arms

The hand of one arm enters the water in a line with the shoulder while pressing down underwater. The elbow bends slightly as the hand pulls water down the center of the body and then pushes water toward the feet. As

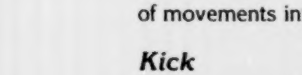
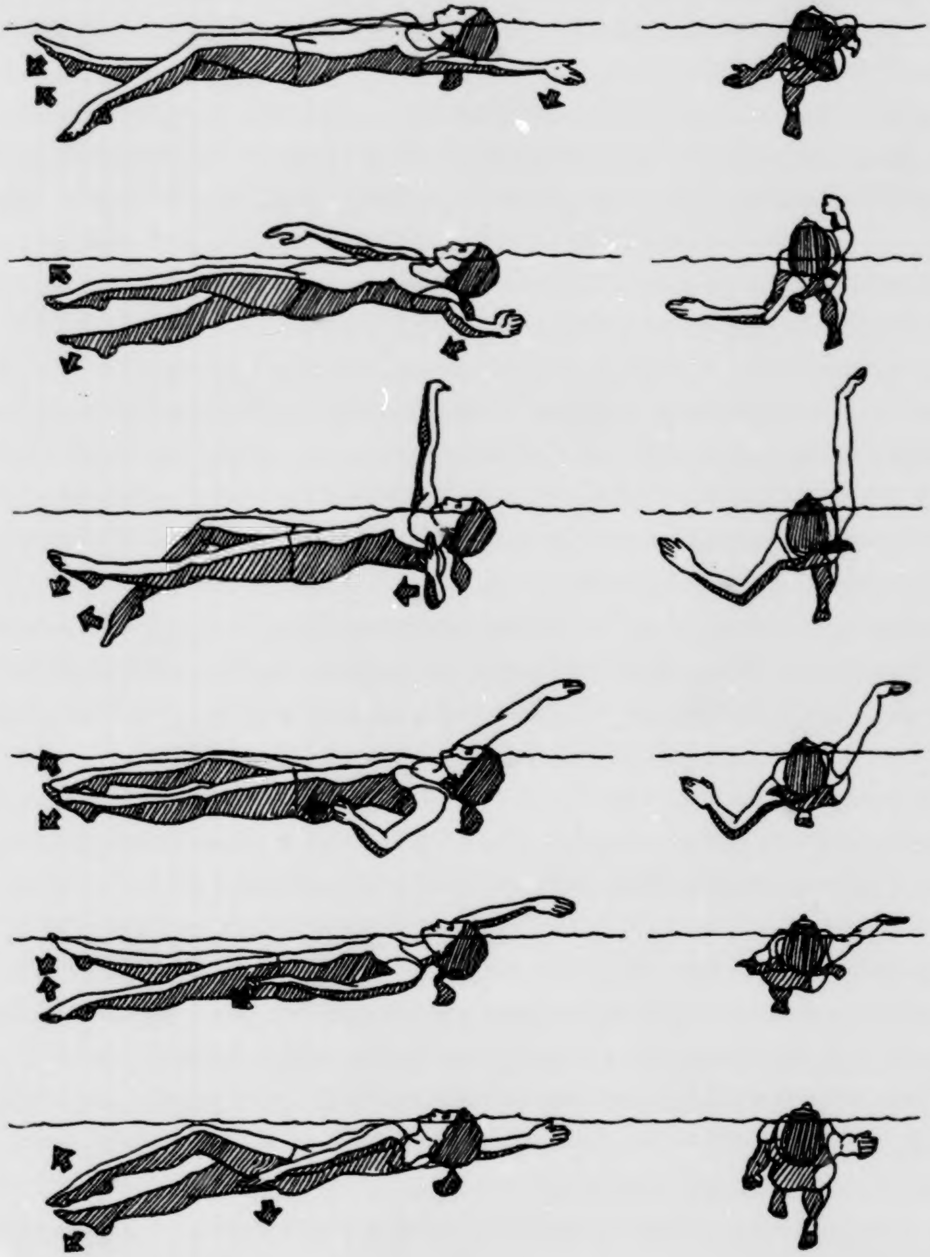


Figure 3. The Back Crawl Stroke



the hand passes under the body, it will finish pushing at the thigh. At this point, the shoulder and elbow lift while the arm is recovered out of the water and the hand is placed in front of the shoulder. During the recovery, the elbow is lifted fairly high, the forearm relaxed, and the hand hangs down beneath the elbow. The arm recovery should be as relaxed as possible, not tense and tight. Hands are firm and straight during the push underwater (not "cupped") and completely relaxed on the recovery.

One arm is pushed underwater while the other is recovered over the water. Timing is best if one arm is exactly opposite the other in a continuous alternating motion, just as in the backstroke. One arm pushing helps the other to recover. An easy body roll toward the shoulder that is underwater helps in the strength and balance of the stroke.

Breathing and Arms
When breathing, the head is turned to one side with the chin up a little as the arm on the breathing side is recovered. The inhalation is quick, through the mouth. The head is then turned back into the water and air is exhaled from the mouth. Keep the head up slightly so the water contacts the head at the hairline.

Kick
The kicking movement is a total leg action all the way from the hips in an up-and-down flutter kick. The knees bend downward slightly at the start of the kick and straighten on the upbeat. Ankles remain relaxed all the time and will flex slightly because of the water pressure against them. The heels should just break the surface of the water on the up kick. This steady alternating kick is best at about three kicks per arm cycle, but there is no rule. See Figure 4 for the sequence of movements in the front crawl.

Breaststroke

The breaststroke is a competitive stroke and is also a resting stroke. Swimmers move in a prone position, alternating arm pulls with leg kicks, and hold a glide at the end of each stroke cycle.

Arms
From a front lying position, with the arms forward in the water and the face in the water, the swimmer presses the hands out in a sideward and downward direction. Before the arms reach halfway to the sides (still in a forward "Y" position), the head is lifted and a breath is taken; the elbows drop down, and the hands move forward together from under the chin. Then the head is returned facedown to the water and the arms straighten out and are held together for the glide. Air is exhaled during the glide and during the first part of the pull.

Legs
The legs begin straight and together at the beginning. The kick pattern is similar to the elementary backstroke. First, the knees bend with the legs slightly apart. Do not allow the knees to "turn out." The knees are pointed down to the bottom and the heels brought up to the body. The recovery is a slow, easy action. The feet and ankles are relaxed to this point; then make a quick movement to a flatfoot position (dorsal flexion). They immediately press slightly outward and backward in a small moving circle, straightening and stretching the knees together at the finish while pointing the toes. The first part of the kick is a recovery; the second part is a power or propulsive phase. The timing of the kick is ONE – bending the knees followed by picking up the feet; TWO – pressing the feet around and back until they come together.

Coordination
When the hands start pressing, the legs begin to recover at the same time. Legs press around and back as the arms reach into the extended position. The glide should be held until the legs begin to sink before starting the next stroke (see Figure 5).

Tips
Some refinements should be made as you progress in learning the breaststroke. The palms of the hands press back as soon as possible within the arm stroke, not sideward. The elbows are held in a slightly bent position during the hand press and should be under the shoulders. Inhalation of air should be completed toward the end of the arm pull but before the forward reach. The timing of the kick in relation to the arms should give a feeling of kicking into the stretched position of the whole body.

In the kick, the action of the ankles is extremely important. The feet must be flat, pushing into extension throughout the power phase of the kick, ending with the toes pointed.

Sidestroke

Along with the breaststroke, sidestroke is one of the oldest swimming strokes. It is extremely useful as a resting stroke, in strengthening the kick for treading water, for lifeguard carries, and for synchronized swimming.

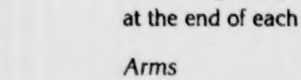


Figure 4. The Front Crawl

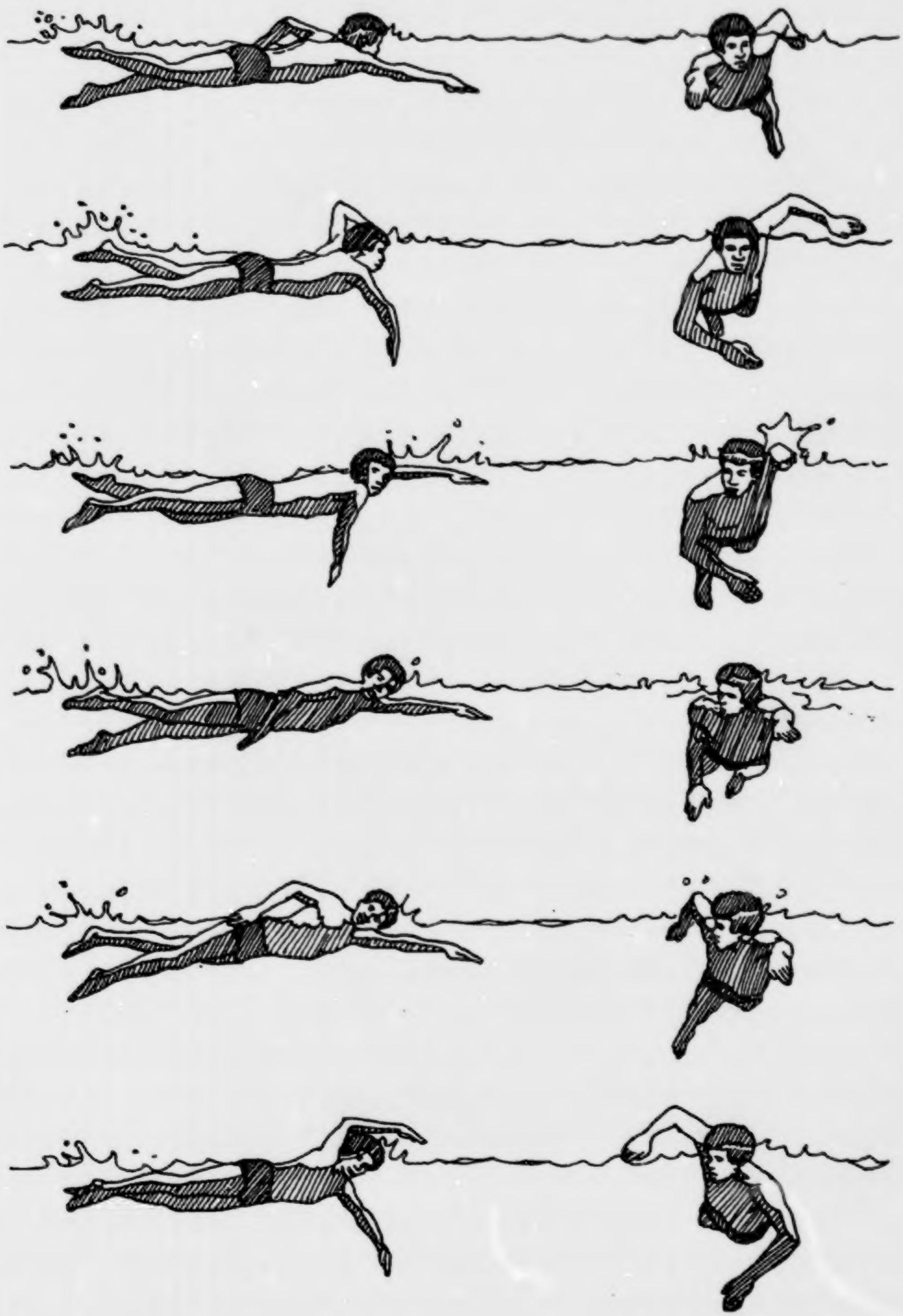
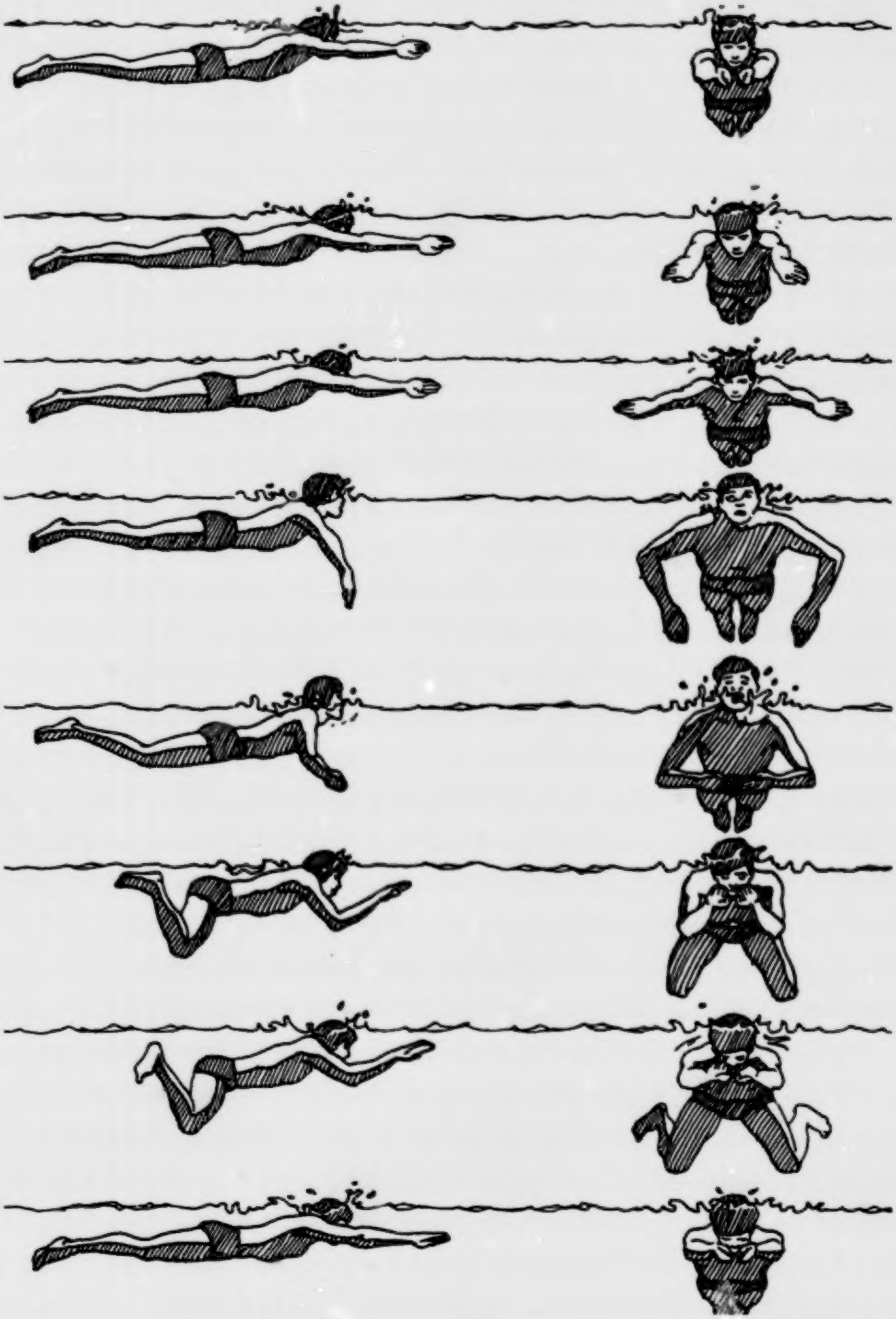


Figure 5. The Breast Stroke



The starting position is on the side, with the legs extended and together. The arm on the lower side reaches straight out overhead on the surface, and the other extends straight along the side of the body. The head lies on the water so that one ear is underwater and is turned slightly toward the back so that the face is clear. The body should remain on the side and in a straight line throughout the stroke.

Legs

The kick provides the propulsive power in this stroke, as in the breaststroke. The arms contribute, but more to balance than to power, and the coordination of the two is important.

From the extended position, the knees bend together, pulling up into a semi-tuck position. The top leg is extended forward and the bottom leg backward simultaneously, keeping both just under the surface. This is done in a sweeping, rounded action while keeping the lower foot pointed and the upper foot flat (dorsal flexion) at the start of the push. Both feet are pointed at the completion of the kick. The strong circular sweep is parallel to the surface in a scissor action (hence called a scissors kick) and finishes as the legs meet together in an extended position. The timing of the kick is ONE – tucking up each of the legs together, TWO – extending out and around in one big motion, completing the kick in the extended position; THREE – holding the legs extended until the glide is complete.

Arms

The upper arm, which is stretched overhead, pulls parallel to the surface toward the body, pushing the water toward the feet. Then it bends while dropping the elbow and returns overhead to full extension. At the same time, the arm at the side is recovered close to the body to a position in front of the face and then pushes out and down to return to the side. The coordination of the arms is similar to a paddle, one and then the other, each pushing in turn toward the feet and then holding at extension for the glide.

First, the swimmer should pull parallel to the surface with the overhead arm. While the knees are tucked, the upper arm is recovered as the lower arm begins extending beyond the head. The propulsive phase of the kick occurs as the upper arm pushes back to the side. This means that the arms and the legs finish in the glide position at the same time and then return to the starting position (see Figure 6).

Basic Entries

Jumping and diving safely into the water are important aquatic skills.

Jumping

Jumping is an easy way to enter the water but should not be attempted unless the water is at least 5 feet deep. If it's not deep enough, use a pool ladder or ease in over the side. If you are starting above the water where the bottom can just be touched, step off the side, reaching out with one foot, and keep the head erect so the eyes can look straight ahead. The feet should be brought together quickly, while the arms are held close to the sides. Remember to hold the breath. While entering the water, anticipate the feet touching the bottom. Knees should be relaxed a little, as if jumping down from a bench on land. This may allow the head to go underwater entirely; then knees should be straightened to permit a standing position. Lean forward after touching the bottom and push forward with the arms extended in front of the body. This is called "leveling off" and means that in shoulder-deep water, it is easy to jump in and proceed to swim.

It is important to jump into deep water. Jumping into waist-deep water or less means that swimmers may land too hard. Impact with the bottom may severely injure the ankles, knees, or back. Jumping into water over the head is safer. The bottom can still be reached, and a push off to the top can still be attained in water that is slightly over the head. In water several feet over the head, a breaststroke can be used after downward momentum has been lost to assist in returning to the surface.

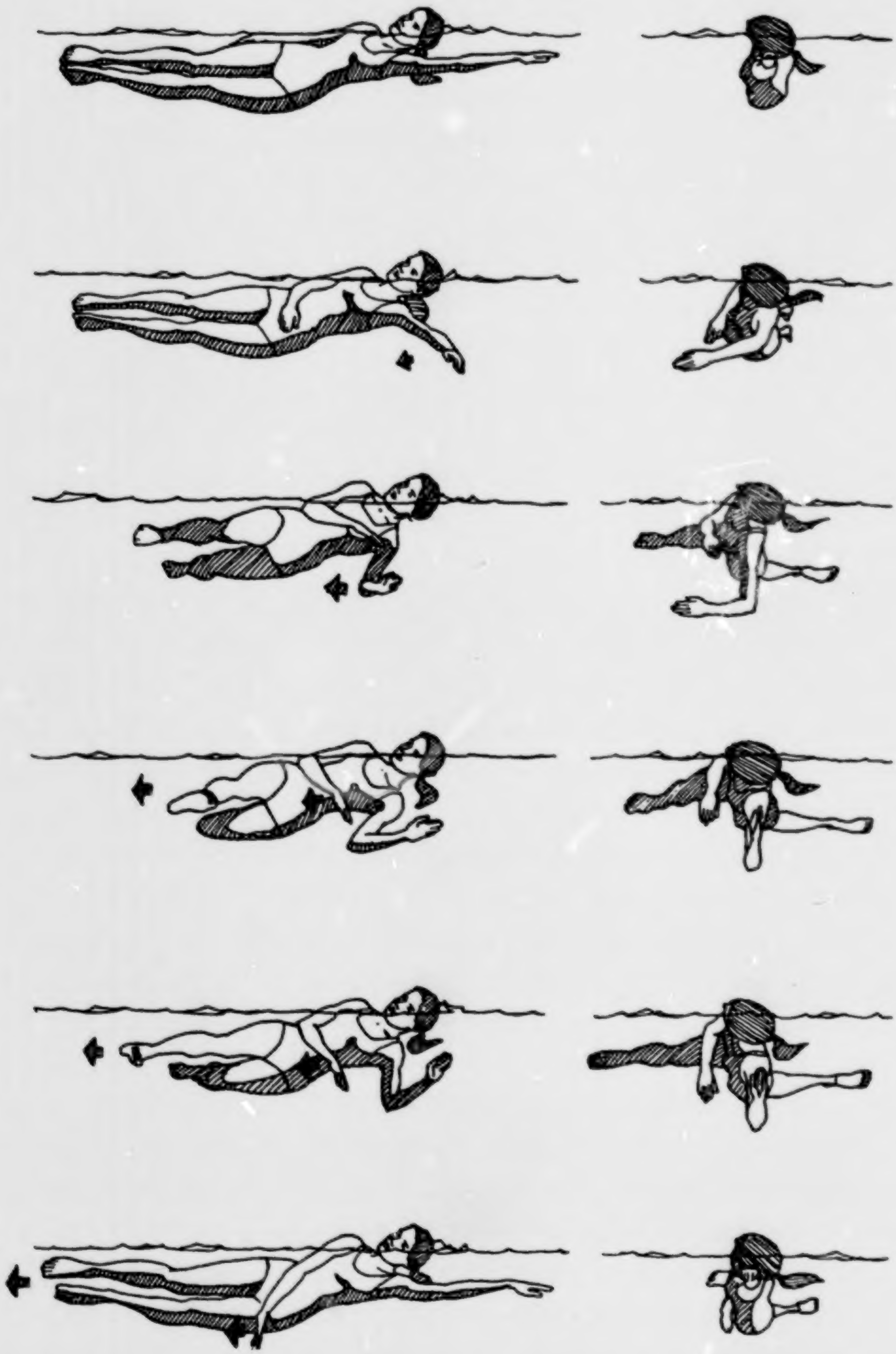
Diving

Diving, or entering into the water headfirst, is an important skill used for gaining more distance when swimming, for speed, and for going deeper into the water. Beginning diving should be taught from poolside in water that is at least 9 feet deep and only after students have learned to swim well.

Learning to dive begins with a sequence of elementary dives learned close to the water at poolside. This sequence includes diving from a prone position, a sitting position, on one knee, and finally from a standing position (see Figure 7 and Figure 8).

Remember that there are some factors that can inhibit the learning of diving skills. These factors include the following:

Figure 6. The Sidestroke



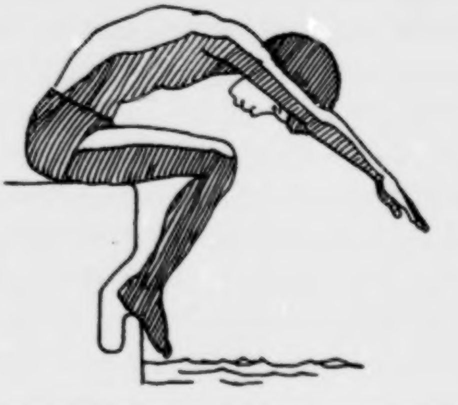
1. Moving headfirst down in the vertical plane is not natural. Leading with the head is characteristic of only a few skills in sport activities, such as football, soccer, swimming, and gymnastics.
2. There may be a fear of landing flat and suffering pain and embarrassment.
3. There is a possibility of getting water in the nose and sinuses.
4. There is a fear of running out of air during descent and then struggling to return to the surface with little air.

Prior to attempting a first dive, remember two important facts about diving. First, all dives must be attempted with the arms extended over the head for protection, and second, a person's head position helps determine the angle of the body upon entry into the water.

To minimize the fear of height, the possibility of landing flat, or descending too deep, the diving sequence of skills should begin by starting the first dive as close to the water as possible. The progression should begin with a prone dive and move through the following sequence, concluding with a standing dive from poolside.

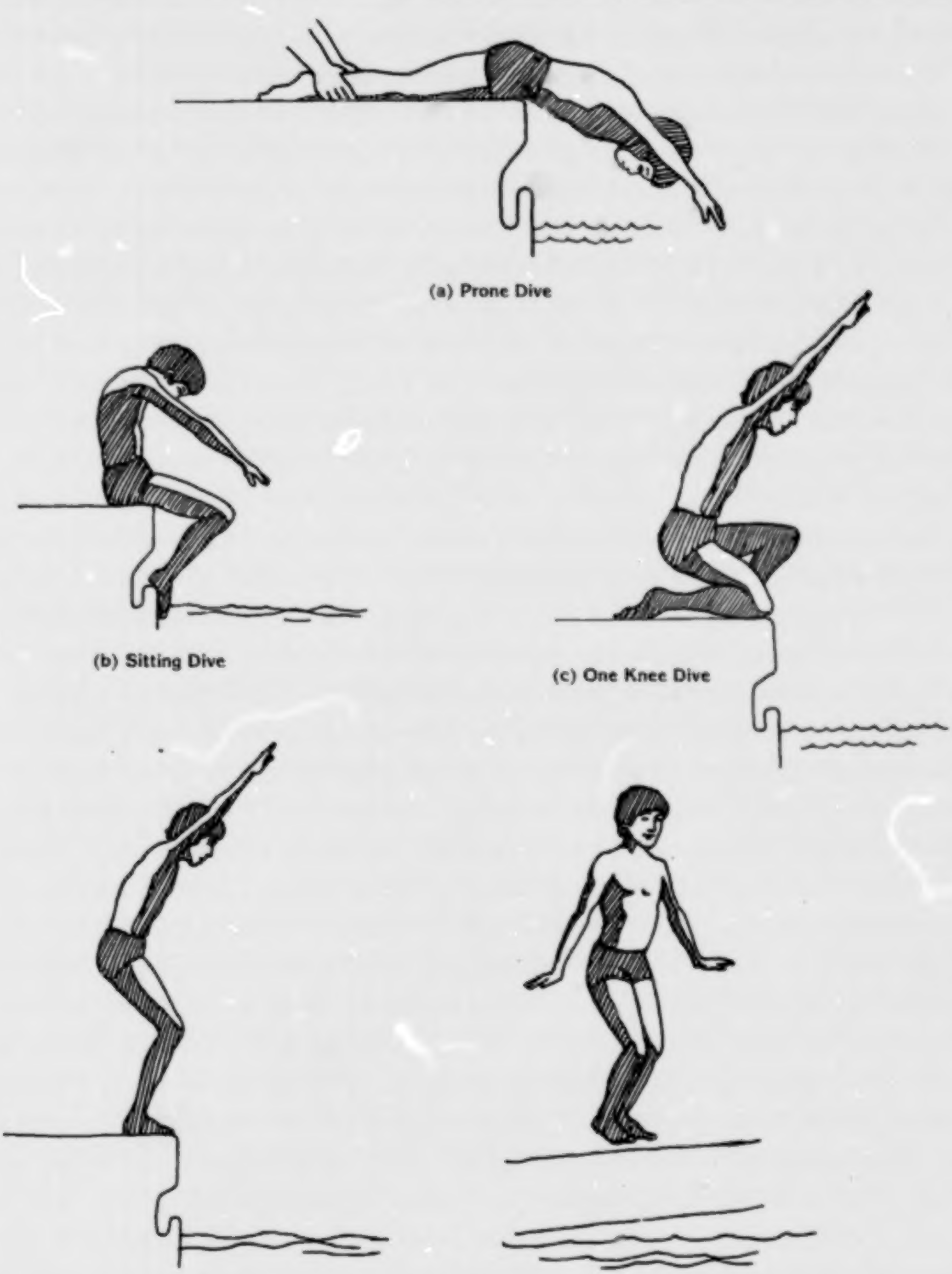
1. **Prone dive.** This entry requires assistance from the teacher. Lie down on the deck with your head toward the pool. If the deck has a coarse surface, you may want to lie on a towel or an old piece of vinyl-covered wrestling mat. The teacher will stand behind the students, holding onto their ankles, one at a time. The students will pull their body out over the water, move their arms to an extended, protective position over the head, then take a breath and hold it. Next the students should tuck their chin on the chest, pike at the hips, and slide over the side of the pool assisted by the teacher so that the students' shins will not hit the wall. Students descend down the wall until they are completely submerged. To return to the surface, they should arch their back and neck, then press their hands toward the bottom and swim breaststroke until they reach the surface. Practice the prone dive repeatedly until you become comfortable with it.
2. **Sitting dive.** This dive moves a little higher above the water surface. Divers begin by sitting on the coping with their feet on the lip of the gutter or held flat against the wall in a pool with rollout gutters. Arms are extended above the head, and the head should begin in the neutral position (chin level and looking straight ahead). Take a breath, hold it, bend at the waist while tucking the chin on the chest, and dive down between the knees along the pool wall. Extend the legs to a straight position and return to the surface as with the prone dive. Practice the sitting dive repeatedly until you can do it comfortably.

Figure 7. A Beginning Dive



3. **Kneeling dive.** The kneeling dive is taught next in order to increase height above the water. It is also a dive that introduces the concept of springing into the air. This dive position begins with the diver kneeling on one knee (back leg) while the front leg is forward, bent at the knee, and the foot is flat with the toes curled over the coping in an effort to prevent slipping. The arms are held in an extended position above the head, the back is straight, and the head is held in the neutral position. This dive begins by pressing down on the front foot while leaning forward slightly. The back leg is *not* used to propel the body upward. It acts only as a stabilizer to provide balance. As the body moves upward, the feet lose contact with the wall; the chin should be brought down slowly toward the chest while the hips pike. Movement of the chin down and the piking action of the hips will transfer momentum downward, allowing the body to enter the water at an angle of approximately 90°. The body should be fully extended in a straight position upon entry. Practice the kneeling dive repeatedly until you have achieved mastery of it.

Figure 8. Learning to Dive



(a) Prone Dive

(b) Sitting Dive

(c) One Knee Dive

(d) Standing Dive

(e) Spring, Arm Coordination Dive

4. **Standing dive.** This is the final dive in the sequence of diving from the deck. The standing dive is initiated by assuming a normal, relaxed, standing position at poolside. Toes should be curled over the side to prevent slipping while the arms are extended over the head and the head is held in the neutral position (looking straight ahead). Next, bend slightly at the knees, take a breath, lean forward slightly, and straighten the legs up to full extension off the toes. Once you are off the wall, the chin should be brought down slowly toward the chest while the hips move into a pike position. This will start the body at an angle close to 90°. The legs will move up into the air as you descend toward the water. The body should be held in a straight position until completely submerged. As soon as the descent rate slows down, return to the surface with the same technique used in the prone dive.

Remember to hold the breath while entering. If water enters the nose, exhale through the nose. Pressure may be felt in the sinuses and ears as the body goes deeper in the water. This is a normal occurrence as one goes below the surface of water. Exhaling while underwater will help relieve the pressure. If actual pain is felt, pinch your nostrils and try to exhale through the nose while returning to the surface.

Treading Water

This skill is necessary to be able to remain at the surface in water that is over the head (see Figure 9).

Arms

A flat scull is done with the hands flat and fingers together. The hands should move back and forth to the front and to the side, turning over at each change of direction so that the palms always push against the water. The hands are kept slanted so that a downward force occurs slightly at the same time. As in all sculling, the movements should be continuous and constant pressure should be felt against the palms of the hands.

Legs

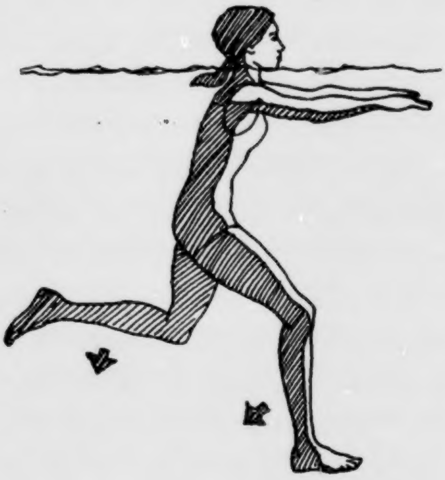
A breaststroke kick or scissors kick provides maximum downward force to keep the swimmer on the surface. See the description of these kicks in the sections on breaststroke and sidestroke leg actions.

When learning treading, experiment with the hand scull in shallow water. Then remove the feet from the bottom one at a time and support the body with sculling alone. Then move to shoulder-deep water and finally to deep water.

Practice for Improvement

Swimming, like all sports, is a skill that will improve with repeated practice. It is important to remember when learning to swim that the basic concepts of movement control (skill level) are experienced in the same way by each person. Skill learning in all sports begins at the conscious level (cerebral cortex), with control reassigned to the automatic level (cerebellum), and then with all skills finally controlled at the reflexive level (spinal cord). The more a person practices swimming skills, the faster their coordination develops, which increases efficiency and endurance. Good swimming instructors and students who want to improve their skills rapidly, plan the number of days each week that they practice and attempt to practice a minimum of one hour each session. Time spent under the trained eyes of a teacher or coach who can provide feedback is very important in refining a person's skill level. Students can also learn to give corrective feedback to each other, which not only helps the student receiving the feedback but also helps the one giving instruction to think about the skill. Three practice sessions of one hour each week is a minimum. Four or five is best and will provide faster results.

Figure 9. Treading Water



Competitive Swimming

Competitive swimming is an exciting sport to watch and participate in while in school. American swimmers have established a reputation of dominance at the international and Olympic levels of the sport.

That dominance is based on getting youngsters started early in age group swimming programs and the many strong high school and college teams in the U.S.

One of the most interesting aspects of competition swimming is the continual changing of events from relays to individual events to springboard diving and from sprint events to middle-distance and distance events. High school swimming meets usually have a format consisting of 12 events, including three relays and nine individual events. Listed below are the typical events conducted in a high school swimming meet and a brief explanation of each event. Relay events consist of six teams with four swimmers each. Individual events consist of six swimmers, with three from each team. The events are as follows:

1. 200-yard Medley Relay – Each school enters up to 3 teams of 4 swimmers. Each relay contestant swims 50 yards, beginning with the backstroke, then the breaststroke, butterfly, and freestyle, in that order.
2. 200-yard Freestyle – 8 lengths freestyle for each contestant
3. 50-yard Freestyle – 2 lengths freestyle
4. 200-yard Individual Medley – 8 lengths (2 lengths butterfly, backstroke, breaststroke, and freestyle, in that order)
5. One-Meter Diving – Up to 3 divers from each team perform 6 dives each:

   One Voluntary Dive – Forward, Back, Reverse, Inward or Twist Dive (Diver's Choice)

   Five Optional Dives are performed, one from each of the above categories.
6. 100-yard Butterfly – 4 lengths of butterfly stroke
7. 100-yard Freestyle – 4 lengths of freestyle
8. 500-yard Freestyle – 20 lengths freestyle
9. 200-yard Freestyle Relay – 4 swimmers, each of whom swims 2 lengths freestyle
10. 100-yard Backstroke – 4 lengths backstroke
11. 100-yard Breaststroke – 4 lengths breaststroke
12. 400-yard Freestyle Relay - 4 swimmers, each of whom swim 4 lengths freestyle

Unlike many sports, a swimming meet has a fixed number of points:

- Relays are scored: 8-4-2-0-0-0 for 1st through 6th place.
- Individual events are scored: 6-4-3-2-1-0 for 1st through 6th place.
- Total point value of 3 relays = 42 points
- Total point value of individual events = 144 points
- Total number of points in a dual meet = 186 points
- The first team to accumulate 94 points wins a dual meet.

Safety Concerns

Every recreational and competitive sport has some inherent risks associated with it. Swimming and diving are no exception. Competitive divers have hit the diving board, and competitive swimmers have sustained paralyzing injuries from racing starts off starting blocks when their head hit the bottom of the pool. The United States is still averaging almost 6,000 drowning deaths annually, the majority at unguarded aquatic facilities, including 500 child drownings in residential pools. Annually, more than 500 recreational divers are rendered quadriplegic from diving and sliding headfirst into less than 9 feet of water. The majority of these accidents occur in residential pools. The following rules, if adhered to, will provide a safer aquatic experience for everyone:

Swimming and Diving Rules

1. Don't engage in breath-holding activities and/or long swims underwater (over 45 feet).
2. Always swim at a facility with a lifeguard.
3. Do not drink alcohol prior to swimming or soaking in a spa.
4. Know the depth of the water before you jump or dive.
5. Never swim alone.
6. Don't eat or chew gum while swimming.
7. Swim on the surface with goggles, never underwater.
8. Stay out of the water when tired.
9. Never slide headfirst; slide sitting only.
10. Always obey the rules and the lifeguard.

11. Know the limits of your swimming ability and don't take chances.
12. Follow the directions given by a lifeguard in the event of an emergency procedure drill or when a real accident occurs.

Resources for Continued Participation in Swimming

Swimming is a skill that is a fundamental step to enjoying the vast world of aquatics. To increase your enjoyment and self-confidence, consider the following developmental steps for continued participation in swimming.

1. **Enroll** in more advanced swimming and lifeguard classes at the local YMCA or Parks and Recreation Department after learning how to swim.
2. **Learn about aquatics** – Obtain some of the textbooks available through the YMCA Program Store or the local American Red Cross chapter. Excellent information is available on water safety, lifeguard training, swimming, pool operation, and small craft activities.
3. **Practice** – Find a pool in your neighborhood at the YMCA or parks department and continue practicing your strokes and skills. Work out frequently and stay in shape at the same time.
4. **Seek employment in aquatics** – There are many job opportunities for lifeguards, swim instructors, and camp counselors, to name a few.
5. **Compete in aquatic sports** – Try out for one of the aquatic sports at your high school, YMCA, or parks department or through a competitive program in swimming, diving, water polo, or synchronized swimming sponsored by one of the national governing boards, i.e., USA Swimming, Diving, Water Polo, and Synchronized Swimming.
6. **Enjoy aquatic recreation** – Water sports are fun. Learn to snorkel or scuba dive. Try water skiing or tubing. Experience sailing, canoeing, or the enjoyment of using personal watercraft. For real excitement, consider surfing, parasailing, kayaking, or white-water rafting.

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CHAPTER 20

Team Handball

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Introduction

Team handball is a new sport emerging on the American scene and one that involves continuous play, high scoring, body contact, and graceful, skilled movements by the players. The game has been described as ice hockey without the ice and sticks, and as water polo without the water. It also combines skills, rules, and strategy that are common to basketball and soccer. Yet, in spite of what appears to be a blend of many different sports, team handball retains a unique nature that makes it attractive to players and spectators of all ages. While on offense, the idea of team handball is to throw a ball past a defense and a goalie, into a goal. While on defense, the idea is to defend one's own goal from the attack of the opponent. There are markings on the court that restrict play in the goal area and therefore influence offensive and defensive movement. Offensively, players move the ball primarily by passing, though a player is allowed to dribble freely, may run three steps with the ball, and may hold the ball for three seconds. Although defensive play permits the use of the torso to obstruct an opponent, rules restrict contact and unnecessary rough play, making the game sensible and safe for players of all ages.

In Europe, where team handball began, the game is referred to only as "handball." However, for most of the United States, the name "handball" brings to mind a game using a little black ball played within a small, enclosed, four-walled room. Thus, in the United States, we use the term "team handball" to distinguish the game involving 14 players, including two goalies, who, on a court larger than a basketball court, attempt to score by throwing a ball into a goal. Germany, Czechoslovakia, and Denmark claim responsibility for the development of games that closely resemble team handball. The game originally was played during the early 1900s, on a large outdoor soccer field, and involved as many as 22 players (11 per team) at one time. The 1936 Berlin Olympics included "field handball" among the team events.

Gradually, modern team handball evolved into its present-day accepted form of seven players per side, predominantly played on an indoor court, the size of which is somewhat larger than a basketball court. In 1946, the International Handball Federation (IHF) was formed, and the rules of team handball were formalized. Today there are 146 nations affiliated with the IHF. The United States Team Handball Federation (USTHF) was formed in 1959, marking the beginning of modern team handball in the United States. In 1972, team handball for men was included in the Munich Olympic Games. Four years later in 1976, the Montreal Olympic Games added women's team handball. Team handball is now a permanent Olympic event for both men and women. The U.S. Men's National Team qualified and competed in the 1972, 1976, 1984, 1988,and 1996 Olympic Games. The U.S. Women's National Team Handball Team made their debut in the 1984 Los Angeles Olympic Games and finished in fourth place, the best finish to date for a U.S. team. In 1984, 1988, and 1996, the United States qualified both a men's and women's team in the Olympic Games although only the women's team represented the U.S. in the 1992 Olympics. Although the United States has yet to win an Olympic medal in team

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handball, qualification for the Olympic Games is a reflection of this sport's potential because only 12 men's teams and 12 women's teams qualify to compete in the Olympic Games tournament.

A new form of team handball developed in the 1990s called "Beach Handball" and became popular in Germany, Italy, and Brazil. Rules are based on indoor team handball, but the game is played in sand on a court slightly larger than a volleyball court (12m x 27m). Regular handball goals are used (2 x3m). Men's, women's, or mixed teams are made up of three court players and a goalie, plus a maximum of four substitutes. The players must play barefoot or in socks. Extra points can be scored in a number of different game situations in beach handball. For example, a goal scored by the goalie from the playing area is two points.

USA Team Handball, formerly the United States Team Handball Federation, is the National Governing Body for the Olympic sport of handball in the United States. As a nonprofit organization, it is designed to develop team handball through schools, recreational leagues, and colleges as well as developing men's and women's teams for the Pan American Games, World Championships, and Olympic Games. USA Team Handball also selects national teams for international beach handball competitions. The foundation of USA Team Handball programs is built on education-based grassroots development from which rises the structure of recreational competition, creating a pipeline for elite athletes to national teams.

Terminology

Attack. A team attacks when they are in possession of the ball.

Centerline. Divides the court in the center; the game begins with a throw-off at the centerline and restarts there after every goal scored.

Charging. An offensive player runs into or over a stationary defensive player who is in proper position.

Checking. Obstructing an opponent from taking a shot or establishing position on offense using the torso and arms (within the rules).

Circle. Area described by the 6-meter line, referred to as the goal area.

Free Throw. Play continues after a minor rule violation; opponents maintain 3 meters from the player taking the free throw.

Free Throw Line. Dashed line at 9 meters used for taking free throws following minor fouls that occur between the 6- and 9-meter lines. Ball is put into play at a point on the free throw line directly opposite from the foul, while the defense must remain 3 meters from the ball.

Goal Area Line. 6-meter line or circle.

Goal Throw. Throw taken by goalie from the goal area after the goalie deflects the ball over the end line (outer goal line) out-of-bounds.

7-Meter Line. A line 1 meter in length, 7 meters from the center of the goal. Seven-meter throws are taken from this line.

Substitution Area. Substitutes must enter and leave the game from an area 4.5 meters either side of the centerline. This designated area is located between the substitution bench and the timekeeper.

Throw-In. When a ball goes out-of-bounds across the sideline, it is put back into play from the spot where it went out-of-bounds.

Throw-Off. The throw is taken after the referee's whistle and is a pass to a teammate at the centerline to start the game and after each scored goal.

Zone Defense. System that protects the defense area and moves in the direction of play.

Fitness Requirements

Being physically fit for team handball includes having endurance (aerobic and anaerobic), strength, flexibility, and the related skill factors of agility, balance, and coordination. Team handball is a 60-minute game of fast, continuous action. Although a player may run more than three miles during a game, short bursts of exertion challenge one's anaerobic endurance. Fitness requirements combine the throwing power and accuracy of football quarterbacks and baseball/softball players, the agility and jumping ability of basketball and volleyball players, and the running speed and endurance of track athletes. Combining skill practice and fitness training in a single drill maximizes the use of practice time. Every practice and game should include a 10-15 minute warm-up period to elevate heart rate and increase flexibility. Cooling down by spending three to five minutes slowly jogging, followed by flexibility exercises, is also recommended.

Skills For Court Players

Passing, Catching, and Dribbling

Team handball is primarily a passing game. A variety of passes can be used effectively depending on the game situation. The primary pass is the shoulder pass, with either an overhand or sidearm delivery. Overhand passes, bounce passes, wrist passes, lob passes, and jump passes are all effective team handball passes. Timing, accuracy, and deception are all elements of a good pass. To catch a team handball, two hands are used to both secure possession and cushion the arrival of the ball. To ensure proper handling of the ball, it should be caught away from the body. Dribbling is a necessary skill but should not be emphasized in play. Players should practice dribbling at full running speed to simulate fast-break situations. Normal offensive movements require infrequent dribbling, but during fast breaks the dribbling skill becomes more important.

Shooting

The basic concept of the game is to throw or shoot the ball into the goal. The most effective shots are taken while moving toward the goal. To become an effective shooter, one must develop a quick release, accuracy with the corners of the goal, and the ability to know when to shoot. By knowing when to shoot, a player will know not to shoot with a defender directly in front of him/her, when he/she is too far away, or at an extreme angle from the goal. Remember that the defensive opponent must first be beaten (out of position) and then one must also beat the goalie. The true essence of the game is a shooter waiting until the last possible second and reading the goalie's position before taking the shot; the goalie must then react to the shot that has been taken.

Set Shot

Form for a set shot is similar to a baseball/softball throw. It may be taken overhand or sidearm; it is bounced or shot directly at the goal (see Figures 1 and 2).

Jump Shot

In this shot, the player attempts to jump in the air and throw over the defensive players. The ball is thrown while in the air and usually involves the use of three full steps to execute. Jump shooters land on the same leg from which they initiated the jump (see Figure 3).

Circle, Dive, or Fall Shot

This is a specialty shot usually taken from the 6-meter line. Upon receiving the ball, the player attempts to dive or fall into the circle (goal area) and shoots while in the air. Upon completing the shot, players normally break their fall with their hands and a chest slide or by a modified shoulder roll (see Figure 4).

Figure 1. The Overhand Set Shot

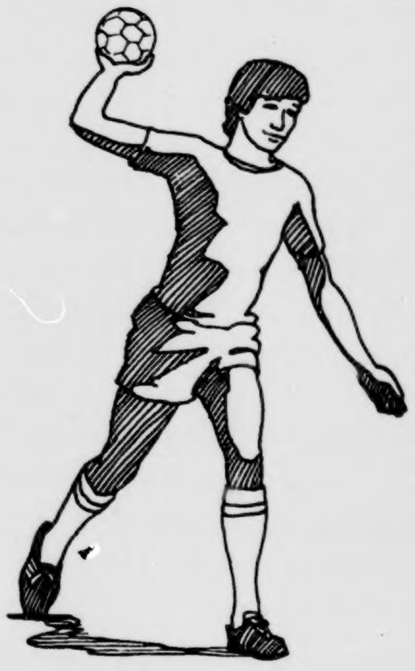


Figure 2. The Sidearm Set Shot

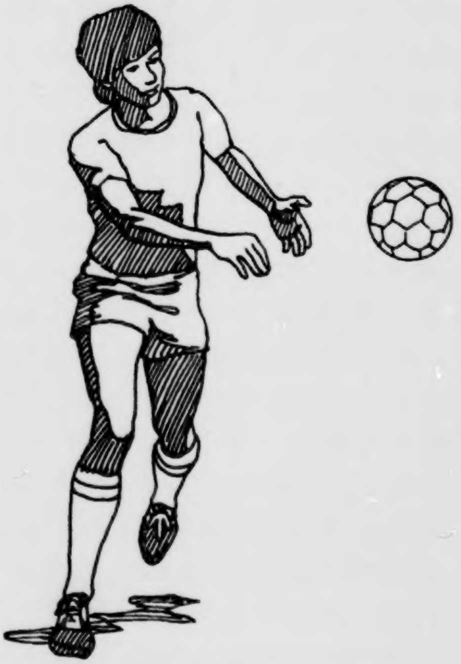


Figure 3. The Jump Shot

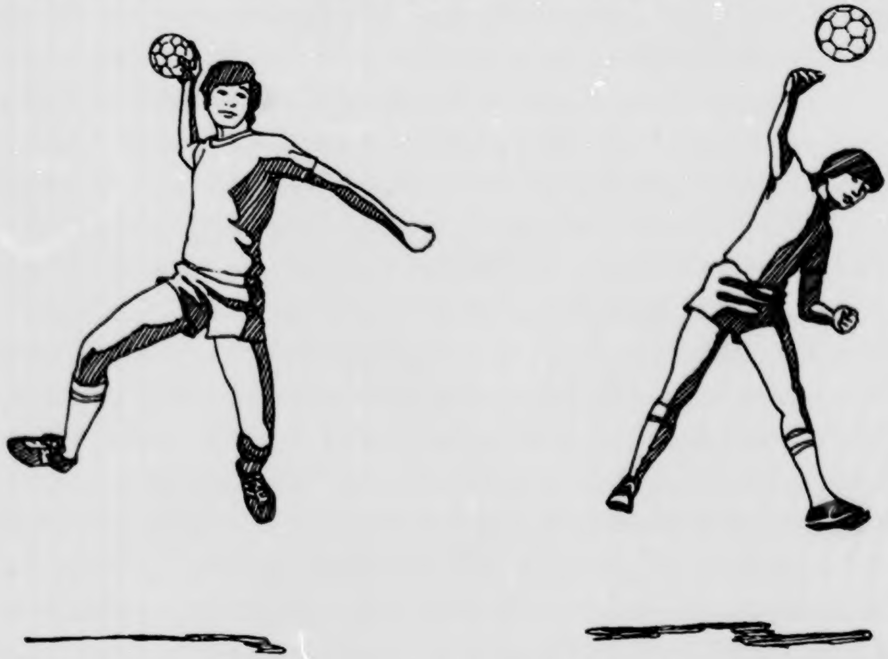
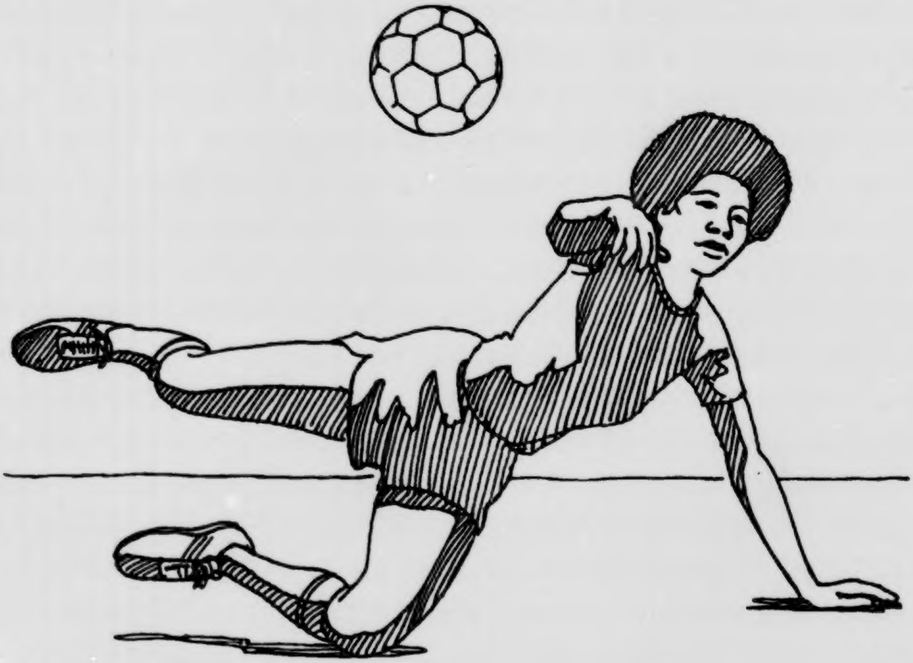


Figure 4. The Circle, Dive, or Fall Shot



Wing Shot

Taken from the wing position, this specialty shot is actually a combination jump shot and dive shot. The wing position in relation to the goal creates a difficult shot from an extreme shooting angle. Wings jump toward the 7-meter line inside the goal area to improve the shooting angle. Recovery for the wing shooter is similar to the recovery for the dive shot.

7-Meter Throw

The referee awards a 7-meter throw when a foul obstructs a clear scoring opportunity. Taken at the 7-meter line, this specialty shot is actually a combination set shot and dive shot. To execute the throw, one foot must be in contact with the floor and cannot touch the 7-meter line. Other players must be behind the 9-meter line and at least 3 meters from the ball (see Diagram 1).

Skills for Goalies

The goalie has a major function on both offense and defense. On offense, the goalie initiates the fast break; on defense, the goalie's prime function is to block shots. Quickness, both in thought and physical reaction, and courage are two major components needed to play the goal successfully. Figure 5 shows three common positions of a goalie.

In 5a, the goalie is in the ready position. In 5b, the goalie is blocking a low shot to the corner. In 5c, the goalie is blocking a shot to the high corner. Several rules apply to the goalie only. The goalies may touch the ball with any part of their bodies and can move about the goal area without restriction. However, the goalie cannot leave the goal area with the ball under control. Although a goalie can enter the playing area to obtain a ball, he/she cannot reenter the goal area

Diagram 1. 7-Meter Throw Execution

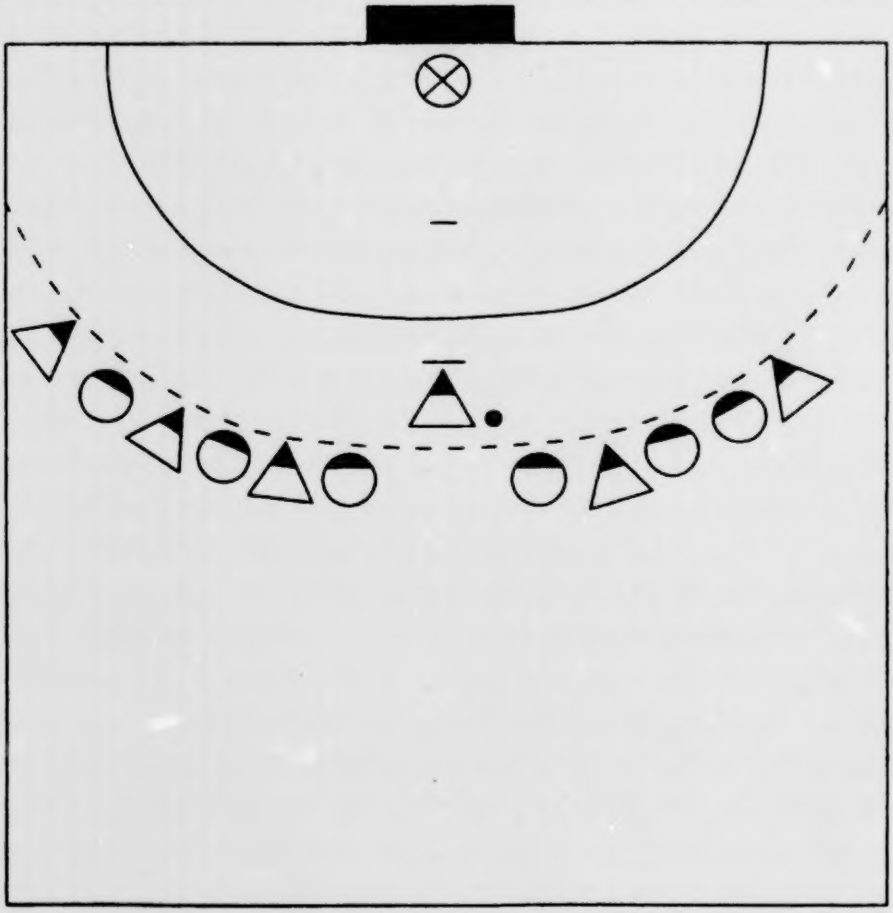
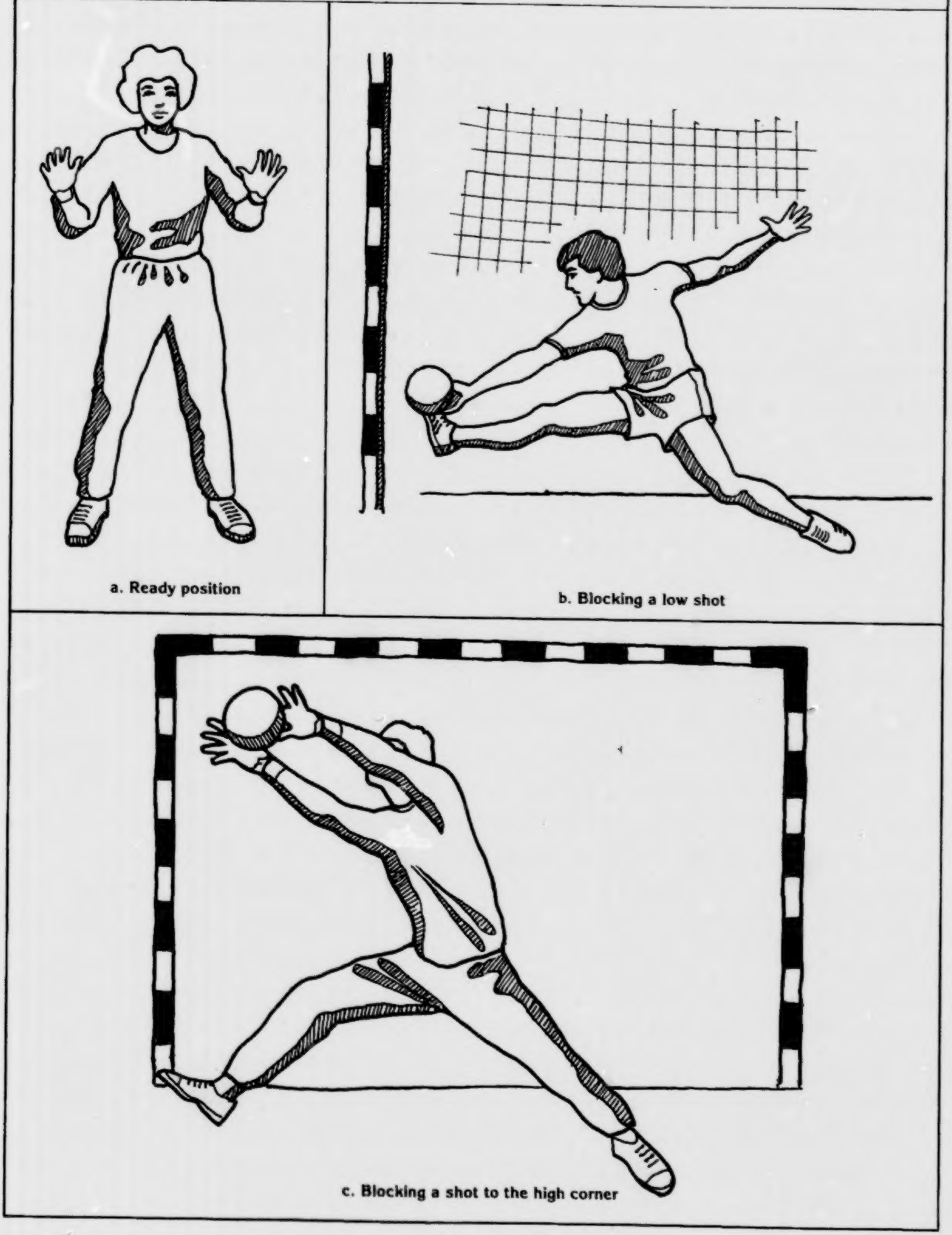


Figure 5. Three Positions of Goalie



a. Ready position

b. Blocking a low shot

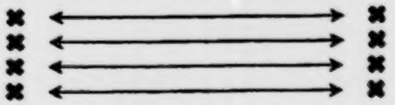
c. Blocking a shot to the high corner

with the ball under control. While in the playing area with the ball in possession, goalies must observe step, dribbling, and 3-second rules as they apply to court players. A court player cannot throw a ball to his/her goalie standing in the goal area; this violation results in a free throw. If a goalie deflects a ball over the end line, the goalie puts the ball back into play by a goal throw. To execute a goal throw, the goalie throws the ball from the goal area into the playing area. If a goalie deflects the ball out-of-bounds across the sideline, the opponents put the ball back into play by a throw-in.

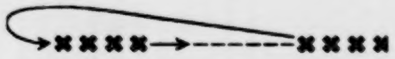
Practice for Improvement

Passing Drills

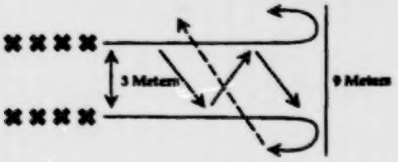
1. Partner Passing – Two lines face one another at varying distances. Overhand, sidearm, jump passes, and bounce passes are attempted between partners. Accuracy is critical.



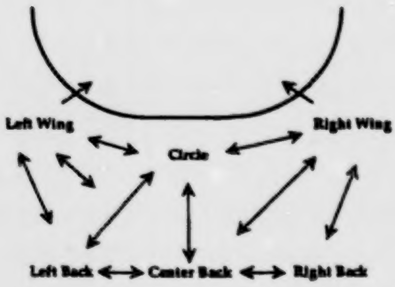
2. Shuttle Passing – Two lines face to the center. Passes can be varied as in partner passing, but now passers move forward to receive the ball and pass while moving. Passers completing their pass move to the end of the opposite line or backpedal to the end of their original line.



3. Pairs Passing – Gamelike conditions of passing while running the length of the court.

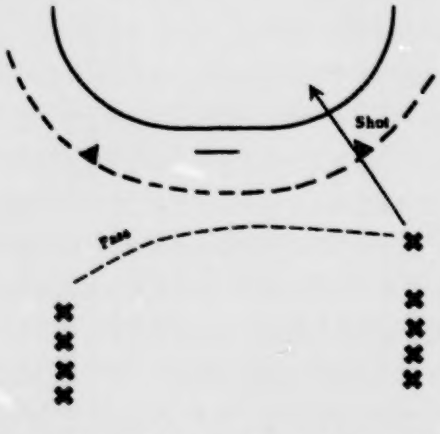


4. Position Passing – Exhaust all possible passes between positions, using continuous passing. Advanced level may have players circulating between positions in either organized or random fashion.



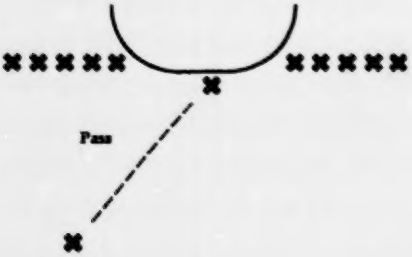
Shooting Drills

1. Set Shot – One line shooting, one line feeding. Change lines so that players pass and shoot from both lines. Variation—add a passive defense player at the free throw line. Shoot from behind the 9-meter line in practice (see diagram below).

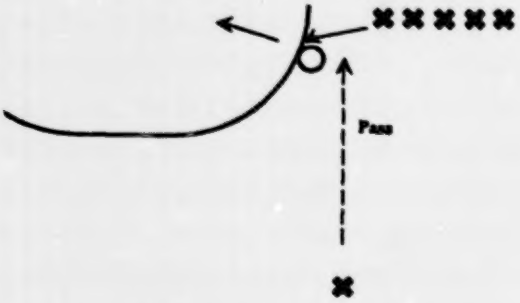


2. Jump Shot – Similar to the set shot drill. Variation—players can cross in the middle with the passer going first and the shooter going behind the passer. Shot should be taken from the middle (see diagram above).

3. Circle, Dive, or Fall Shot – Pass from the backcourt position to the circle runner position. Circle runner catches the ball, turns to the goal, and falls or dives while taking the shot.



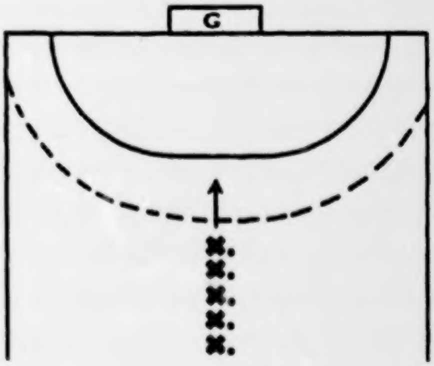
4. Wing Shots – Low angle shots taken while jumping toward the 7-meter line into the goal area following a pass from the backcourt.



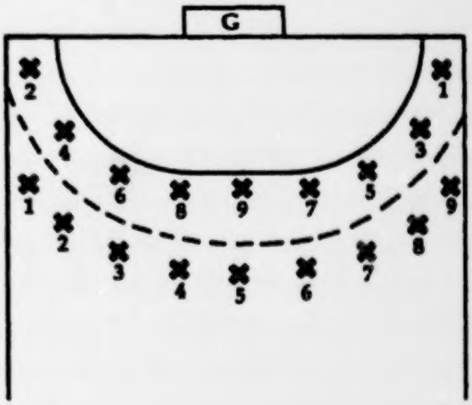
Goalie Drills

1. Perceptual Clues – Offensive players form a single-file line, each with a ball. They successively throw set or jump shots at the goal according to the following sequences:
   - A. Low left, low right, low left, low right, etc.
   - B. High left, high right, high left, high right, etc.
   - C. Low left, high right, low left, high right, etc.
   - D. Low right, high left, low right, high left, etc.

   This allows goalies the advantage of knowing where the next shot is coming from, reading the perceptual cues of that shot, and providing the movement element drill necessary to develop proper technique.

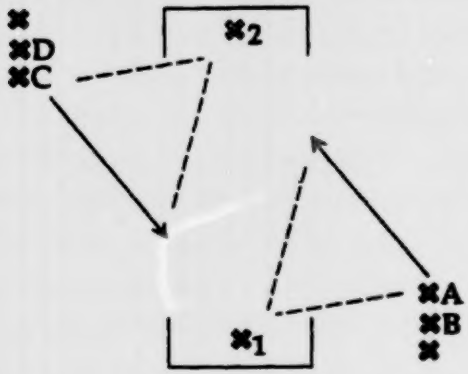


2. Position Shooting – Shooters stand on either the 6-meter or 9-meter line and alternate their shots from wing to wing, working toward the center, or they may shoot in sequence.



3. Fast Breaks and Passing/Shot Blocking – Players A and C start by passing a ball each to their respective goalies. A and C then sprint the length of the court as in a fast break for an outlet pass from their goalie. Upon receipt of the pass, Player A attempts to score on goalie #2 and Player C attempts to score on goalie #1. Once these blocks are completed, the next players in line pass a ball to their goalie and sprint for a fast

break. Players exchange lines and maintain dribbling and step rule integrity before shooting.



Tips For Beginning Play

1. Modify the court to suit available area indoors or out; width is more important than length. Regulation goals, net, and balls are recommended but can also be modified to include available equipment.
2. Team handball is a passing game—limit dribbling. Try a lead-up game of keep away with no dribbling allowed.
3. No body contact. Play basketball-style defense in the beginning. Prohibit defensive players from pressuring the offense full court. As offensive skills are acquired, allow hand checking, limited contact, and, finally, arm and body checking.
4. Each time on offense, every player touches the ball at least once before a shot is attempted.
5. Substitute only when on offense.
6. Beginning players have a tendency to shoot at the middle of the goal, right where the goalie stands! Shoot at targets in the high and low corners of the goal to practice accuracy. Drape a gym mat or sheet over the front of a goal, leaving only the high and low corners exposed. Tie hula hoops in the high goal corners and place large cones in the low corners.
7. Rotate into the goalie position for an allotted time to gain an appreciation of the difficulty in playing the position.

Safety Concerns

Most team handball injuries result from collisions with players or goalposts, ball contact, and sprains and strains due to overuse or over stress. To facilitate a "fear-free" game for any beginning players, USA Team Handball recommends the SuperSafe Elite 6 3/4", an air-filled foam ball with the same weight and size of an official leather women's competition ball. Recognizing the physical nature of the game, the International Handball Federation continues to evaluate and change rules to protect the health of players. The following actions that endanger an opponent's health are penalized by immediate disqualification:

- A player, from the side or from behind, strikes or pulls back the throwing arm of the opponent in the act of shooting or passing.
- A player takes any action resulting in the opponent being struck in the head or neck.
- A player strikes the body of an opponent with the foot or knee.
- A player pushes a running or jumping opponent, causing him/her to lose body control.
- Repeated unsportsmanlike conduct.

Beginning players should play noncontact, basketball-style defense (considered a contact sport, team handball does have official rules that allow torso contact) until players clearly understand illegal contact and can demonstrate allowable contact. Beginners have a tendency to throw the ball at the goalie rather than to the corners of the goal. Because of the angle and close proximity to the goal, wing shots are particularly dangerous to the goalie. Players must learn to look at the goalie's position and shoot to the open spaces in the goal. Develop accuracy by shooting at targets in the goal (towels, hula hoops, or cones in the corners of the goal) or by taping a goal on the wall and marking the best corner shots. Beginning goalies should modify the wing shot ready position to use two hands in front of the face to protect against an unintentional face shot. It is recommended that all players wear safety sport glasses attached with a strap. Rules prohibit players from wearing anything that might cause injury to another player (i.e., watches, jewelry, face mask). Kneepads and elbow pads protect players executing diving shots.

Competition

Playing area

Diagram 2 supplies the measurements of the court and shows the names of the various lines on the court. Note that the areas enclosed by the 6-meter line, or goal area line, have been shaded in gray. If, while scoring a goal, the offensive player steps inside the goal area or steps on any part of the 6-meter line, the goal does not count and a goal area violation occurs. Similarly, if the defense steps in the goal area or on the 6-meter line and gains an advantage by doing so, a 7-meter throw is awarded.

Only the goalie is allowed to stand inside the gray goal area. However, both offensive and defensive players have "air space rights" inside the goal area. A ball or player is not considered to be in the goal area if they are in the air. While trying to throw the ball into the goal, offensive players may jump into the goal area, as long as their takeoff was from outside the goal area and they release the ball before landing in the goal area. Likewise, the defensive player may jump into the goal area in an attempt to block a shot on goal, but may not touch the ball while in contact with the goal area. Once play is completed in the goal area, players entering must exit by the shortest possible route. The goal area is usually referred to as the circle or circle area. The 9-meter line, or free throw line, is used when minor penalties are given in the game. The 7-meter line is used when major penalties are given. It is important to note that a team handball court can be adapted to an area smaller than the regulation 20 x 40 meters, but the width of the court is more important than the length.

Diagram 2. Team Handball Court

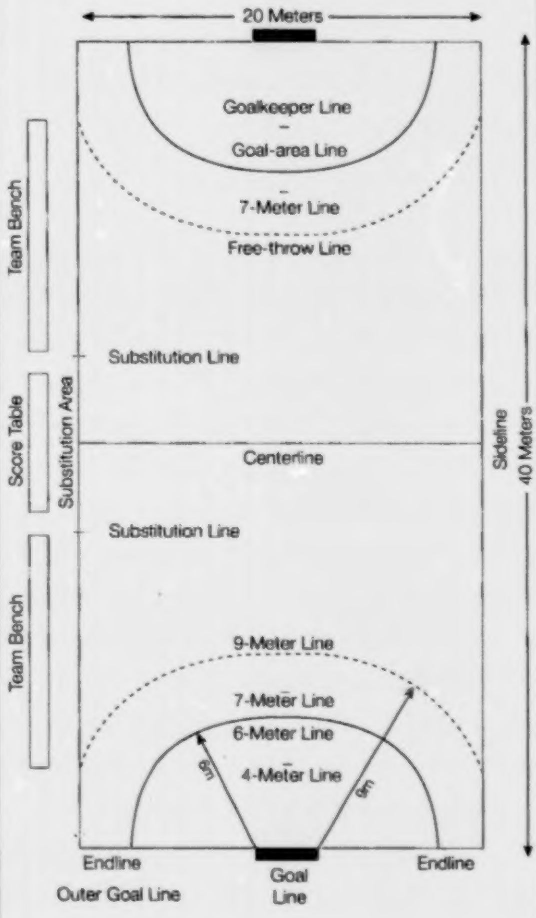


Diagram 3 is an example of a regulation goal. Goals are 2 x 3 meters and are provided with a net. They are usually made of wood or metal tubing, with the goal face painted in contrasting colors.

Players

Internationally, a team is allowed a total of 12 members. A playing team consists of seven players, six court players, and one goalie; there are five substitute players who may enter the game at any time from an area called the substitution area, located 4.5m on either side of the centerline in front of the officials' (timekeeper and scorekeeper) table (see Diagram 2). A substitution may not be made until the player leaving play has left the court. All players dress similarly, but goalies must wear different color shirts from their teammates and opponents. Diagram 4 illustrates a commonly used offensive formation with the names of each position player. For the best possible throwing angle at the goal, coaches prefer that both the right wing and right backcourt players throw with the left hand, and both the left wing and left backcourt players throw with the right hand.

Rules

Ball

The ball used in team handball looks like a small 32-panel leather soccer ball. Men use a size 3 ball that weighs 15 to 17 ounces and measures nearly 24 inches in circumference. Women and youth use a size 2 ball

Diagram 3. Team Handball Goal Dimensions

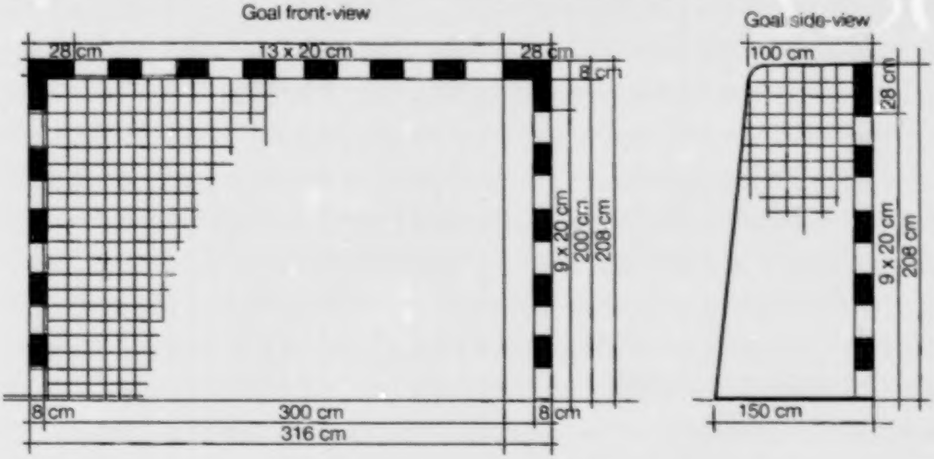

Goal front-view
28 cm
13 x 20 cm
28 cm
8 cm
9 x 20 cm
200 cm
208 cm
8 cm
300 cm
8 cm
316 cm
Goal side-view
100 cm
28 cm
9 x 20 cm
208 cm
150 cm

Diagram 4. Players

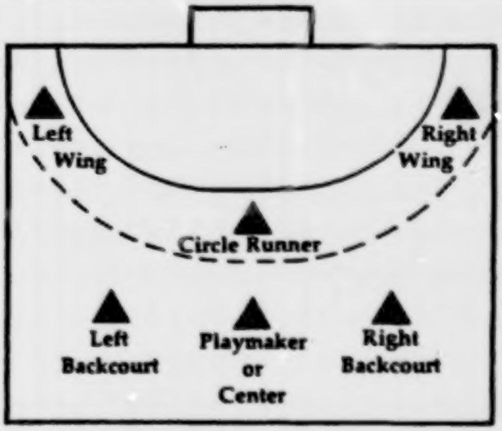
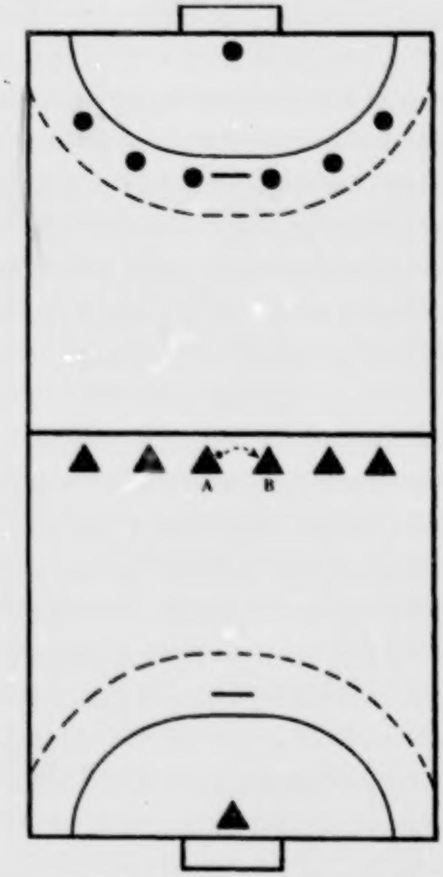

Left Wing
Right Wing
Circle Runner
Left Backcourt
Playmaker or Center
Right Backcourt

Diagram 5. Starting the Game with a Throw-off



that is lighter (12 to 14 ounces) and smaller (nearly 22 inches in circumference). There is an even smaller leather ball used for elementary children in a game called mini-handball. Softer foam balls may be used when learning the game, but the regulation leather-covered ball with a rubber bladder is recommended for official competition.

Duration of the Game

There is a one-minute time-out in team handball per team per half. Men and women play two 30-minute halves with a 10-minute intermission. Players 15-17 years old play 25 min. x 2, players 13-15 years old

play 20 min. x 2, and players under 13 play 15 min. x 2. For tournaments, playing time is often modified to meet the needs of the participants.

Starting the Game

The captain winning the referee's coin toss has the choice of ends or a throw-off. The throw-off must be taken within three seconds of the referee's whistle. The throw-off entails passing the ball from the center of the playing court (in any direction) to any teammate. For the throw-off at the start of each half (including overtimes), all players must be in their own half of the court. However, for the throw-off after a goal has been scored, the opponents are allowed to be in both halves of the court. Rules require defenders to remain at least 3 meters from the player executing the throw-off. Diagram 5 shows the throw-off formation used to start each half and overtimes.

Playing the Ball

Players may run three steps before and after they dribble. Players may only hold the ball for three seconds when stationary. Diagram 6 depicts the sequence of movements a player may take upon gaining control of the ball. The rules allow players unlimited dribbling but prohibit double dribbling. Because of America's strong background in basketball, beginners tend to dribble too much when learning team handball. Dribbling slows the tempo of this fast-paced passing game. Playing-the-ball violations result in free throws for the opponents. Players may not play the ball with their legs below the knee. Pulling or hitting the ball out of an opponent's hand or throwing it at a player in a dangerous manner are not allowed.

Contact with the Opponent

While the attackers try to break through the defense, the defenders try to protect their goal; in the process, body contact is unavoidable, yet it is still limited by the rules. Using their torso, players are allowed to obstruct an opponent with or without the ball. However, using the outstretched arms or legs to obstruct, push, hold, trip, hit, or endanger an opponent in any other way is not allowed. With bent arms, the defender can make body contact with an opponent when facing him/her and maintain this contact in order to defend the opponent. Proper checking techniques will be covered in the Elements of Defense section. Offensive players are not allowed to charge into a properly positioned defensive player. Offensive or defensive violations of these contact rules result in a free throw for the opponent.

Throw-In

If a ball goes out-of-bounds on the sideline, a throw-in is taken near the spot where the ball crossed the sideline. Without a whistle signal, the player takes a throw-in by placing one foot on the sideline and putting the ball into play by passing to a teammate. The defense must be at least 3 meters away from the ball. If a defender is the last person to touch the ball before it crosses the end line, a throw-in is taken from the point where the sideline and end line meet on that side. In diagram 7, Player A executes a throw-in by passing to any other team member—in this case, Player B.

Goal Throw

A goal throw occurs each time an attacking ball crosses the end line without entering the goal. The goalie puts the ball back into play by throwing it from the goal area into the playing area.

Penalties

When minor rule violations occur, a free throw is awarded. The free throw is taken from the place where the violation occurred and without the intervention of the referee. The defense must remain 3 meters away from the player taking a free throw. The thrower may

Diagram 6. Playing the Ball

	MAY	MAY	MAY	MUST
Player receives the ball.	**Take 3 steps.**	**Dribble (as many times as desired).**	**Take 3 more steps.**	**Pass or shoot within 3 secs.**

Diagram 7. Throw-In from the Corner

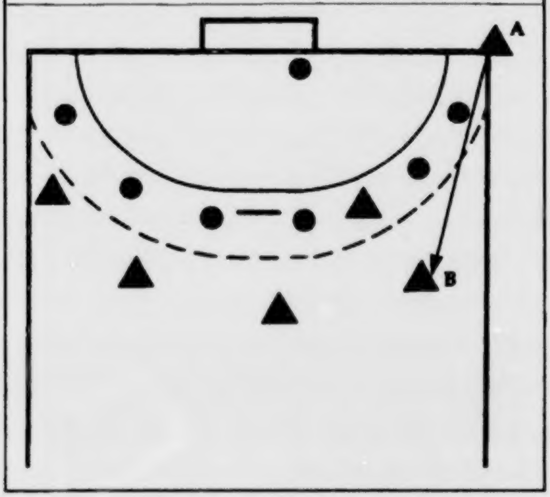
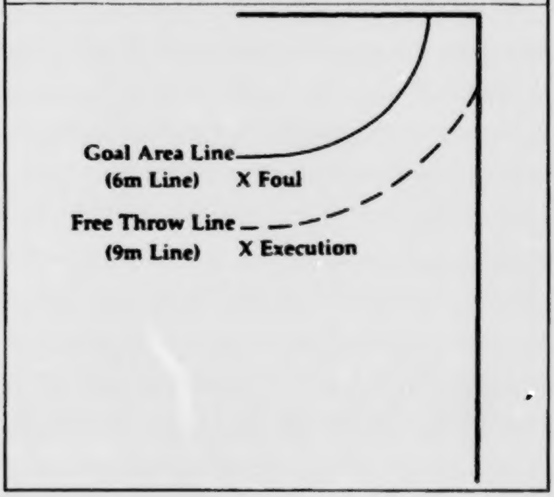


Diagram 8. Free Throw



pass to any teammate within three seconds while maintaining one foot in contact with the court. The thrower may score directly from a free throw. The majority of minor fouls or common fouls occur in the area between the goal area line (6-meter line) and the free throw line (9-meter line). When this occurs, the free throw is taken from the free throw line at a spot directly opposite from where the foul occurred, as in Diagram 8.

A 7-meter throw, a direct shot at goal taken within three seconds of the referee's whistle, is awarded for more serious rule infractions. Seven-meter throws are usually awarded when an offensive player is in good shooting position and has an almost sure chance of scoring when fouled. To determine whether the foul that occurred should be given a 7-meter throw or a free throw, the referee must carefully consider the position of the offensive player, that is, whether a clear scoring position had been established and whether the foul took that scoring chance away. If, during a shooting drive by an offensive player, a minor foul occurs that does not interfere with the advantage the shooter may be gaining, the referee will let play continue. To execute the 7-meter throw, a player must keep one foot in contact with the court behind the 7-meter line until the ball is released. All other players must stand behind the 9-meter line when the 7-meter throw is taken. Any player on the team that is fouled may take the 7-meter throw. Internationally, 7-meter throws result in a goal nearly 80% of the time.

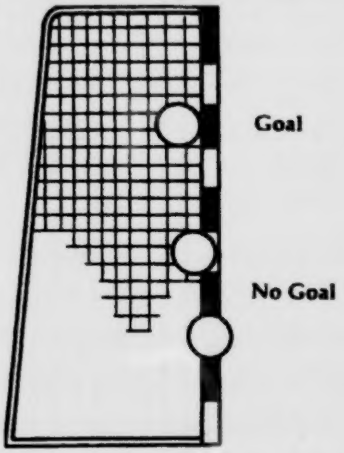
Other Sanctions

Infractions of the rules regarding contact with the opponent in which the action is mainly directed at the opponent and not at the ball are to be punished progressively. Depending on the seriousness of the foul or unsportmanlike conduct, the referee can either give a warning (yellow card), a suspension (two minutes), or an instant disqualification (red card) and, in the case of violence, exclusion. When a player receives a 2-minute penalty, the team must play "short" (suspended player on the bench) until the penalty time has been served. Examples of dangerous play resulting in disqualification are listed under safety concerns in this chapter.

Referees

Two referees are used in team handball. They control the game solely by whistle and hand signals. The referees rarely touch a ball because players retrieve balls to be put back into play. Because of the fast pace of the game and the body contact that is allowed, the referee has a very difficult task. Although holding, pushing, and hitting are fouls and result in free throws, individuals do not carry a limit to the number of these fouls they can commit. However, repeated intentional fouls or dangerous play can lead to a 2-minute suspension. A certain level of contact, holding, hand checking, and pushing occurs throughout the game and will not draw the referee's whistle, depending on the level of the play and experience of the teams involved and the degree of the violations occurring.

Diagram 9. Goal/No Goal



Referees are charged with the control of the game and safety of the players and must enforce the rules to allow both players and the game to develop.

The preceding pages include information concerning the basic team handball rules. To ensure a complete and thorough understanding of the rules, players are urged to obtain an official copy of the latest team handball rulebook from USA Team Handball.

Scoring

Team handball action produces a lot of scoring. For example, a typical game played 30 min. x 2 might produce a team score in the high 20s or low 30s. A one-point goal is scored when the referee decides that the entire ball crossed the goal line under the bar and between the posts (see Diagram 9).

Tactics

Principles Of Offense

Offensive Strategy-Fast Break

Offensive attack is generated by a strong defense. This is because the defense is in a position to steal a pass, block a shot, or take advantage of an offensive mistake to initiate a fast-break attack before a defense can develop. If the fast break is successful, the eventual shooter should face the goalie from close range uncontested by a defensive player. The goalie is a major factor in the fast-break attack because not only must a shot be blocked in order to gain possession of the ball, but then the ball must be quickly recovered so that an accurate pass can be made to breaking players. Wing players are usually the faster players on the court and are also usually the players who lead the fast break. If the initial fast break does not result in a score, team strategy then shifts to the remaining players following the initial break. These trailing players constitute a secondary wave of attack, and they attempt to attack the defense before they fully recover to their organized defensive positions.

Offensive Strategy-Organized Attack

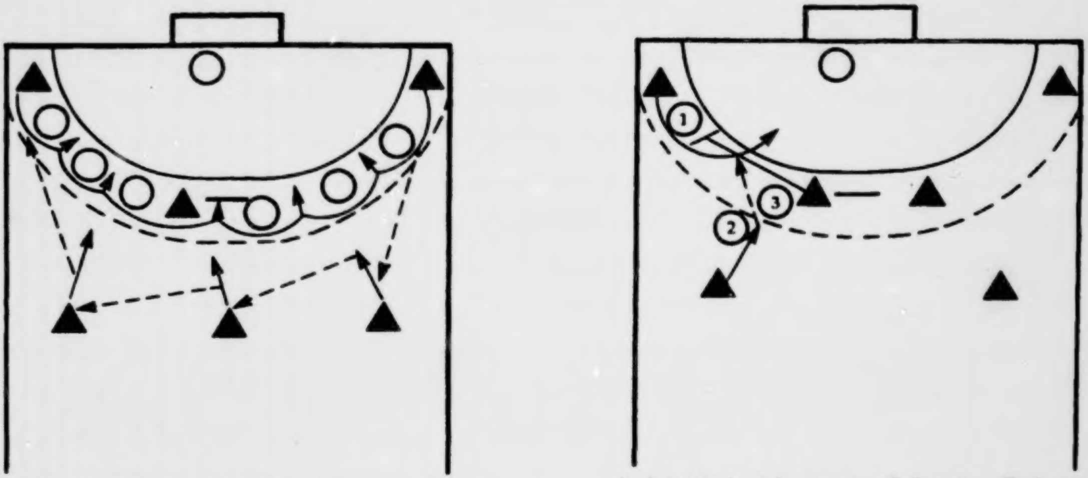
If the primary and secondary fast breaks do not yield a clear shot, the offensive players assume their basic positions and begin a systematic attack. Movement and play can be organized around complex team plays, 2- and 3-player combination patterns, or an individual's free attack. A team handball organized attack resembles a basketball offense in that it incorporates a variety of screens or blocks and pick and roll and give and go movements (see Diagram 10a and 10b).

A good, organized offensive attack comes from coordinated movements between backcourt, circle runner, and wing players. Coupled with this coordinated movement, the team must have quick, accurate passing. Passing enables the offense to force the defense to shift into imbalance and thus create openings. The key elements in offensive attack are passing, movement (with and without the ball), and patience. Effective wing and circle play serves to take defensive pressure off backcourt players and permits them, in turn, to become more effective in attack. Likewise, effective backcourt play serves to open up offensive play for the wings and circle runner. A balanced scoring attack is the ideal situation in team handball.

Elements Of Offense

1. Players should always be in motion before they receive any ball.
2. After receiving the ball, a player should attempt to get into a scoring threat position to draw the defense and to attract the goalie's attention.
3. It is essential that each player passing the ball to a teammate do so in such a manner as to not slow the player in motion to receive the pass—these "lead passes" provide a further advantage to the attacking player. Properly executed, this has a cumulative effect for the offensive team and ultimately places a player in a clear shooting

Diagram 10. Playing the Ball



a. 3:3 Attack-wing switch. Wings exchange positions randomly looking for an opening in the defense for a pass and shot.

b. 2:4 Attack-circle runner pick for wing. Circle runner picks ① . Left backcourt attacks ② while left wing cuts off circle runner pick, and looks for pass from left backcourt for a shot.

position by moving the ball more quickly than the defense can adjust to the ball movement, player movement, and scoring threat.

4. An attacking player should attempt to draw two defensive players. Properly executed, lead passes, offensive attacks, and drawing defensive players effectively yield a two-on-one opportunity for an offensive player. Often, if initiated by one wing, an open shot results for the opposite wing.
5. Team handball is a PASSING game. While dribbling is allowed and should be practiced (especially for fast breaks), it generally slows the movement in the organized phase of an offensive attack.
6. Players should avoid being "tied up" or fouled by the defense to the point where the referees must stop play with a whistle and award a free throw. Keep the ball moving by passing to get the defense out of position. Constant whistles by the referees to award free throws for minor fouls are an indication that the defense is doing a good job in stopping the offensive attack.
7. It is important to try to spread the defense from wing to wing; therefore, the offensive team should maintain position balance on the court.
8. Although set plays can be relied on for offensive structure, each player must be encouraged to take the initiative to be a scoring threat by developing one-on-one offensive moves. Individual improvisation and simple combinations (picks, screens, crosses, pick and rolls, give and goes) are more effective than set team plays to take advantage of scoring opportunities.
9. At the highest level of international play, teams will quickly shift from one speed of passes to a much faster passing and moving sequence. This change in pace catches the defense out of position when a quicker attack is initiated.

Principles Of Defense

The basis for a good offense begins with a good defense: the defense in transition becomes an opportunity for a fast-breaking offense. Therefore, the first responsibility of a defensive team is to stop the fast break before becoming organized into their defensive formation. The defensive players must remember that they are basically defending the 6-meter, or goal area, line. Therefore, they should be careful not to let an offensive player get between them and the 6-meter line unnoticed. If they must leave the 6-meter area to check against a jump or set shooter, they need not venture beyond the 9-meter line, depending on the

shooting ability of the opponent. Once the check has been completed, the defensive player must immediately return to the 6-meter line to once again fill the area left open by the checking movement.

Individual defense is played on the balls of the feet with the knees slightly bent. Hands and arms are held at the sides to block possible set or jump shots and block any passes to an offensive circle runner. Individuals shift laterally along the 6-meter line to balance any attack of the offensive players. Defensive players should always assume responsibility for one offensive player and be ready to help the players on their sides with their offensive opponent. It is easiest to think of team handball defense as being a zone defense until an offensive player with the ball threatens to shoot. Once a player is in a threatening shooting position, defense becomes one-on-one, and contact should be made. Proper checking technique is vital to playing good defense and to the safety of all players. Remember, unnecessary rough play will result in a 2-minute suspension. On the other hand, a too-passive defense will allow offensive players to penetrate their line and score easily. When checking an opponent, the player must impress the referee that the body is being used to obstruct an opponent while reaching for the ball with a free hand. Figure 11 depicts two defensive movements. A defensive player blocking a jump shot using both arms and a slight jump to counter the offensive player's jump is demonstrated in 11a. In 11b, a classic body check of an offensive player who may be in a set shooting position is shown; note that both players remain on the floor.

To control the offensive circle runner, the defense usually relies on hand checking (to know the circle runner's position, while watching the ball) and then by blocking any attempt to pass the ball to the circle runner by using their arms or body to deny position or the ball. Although checking is a part of team

Diagram 11. Playing the Ball

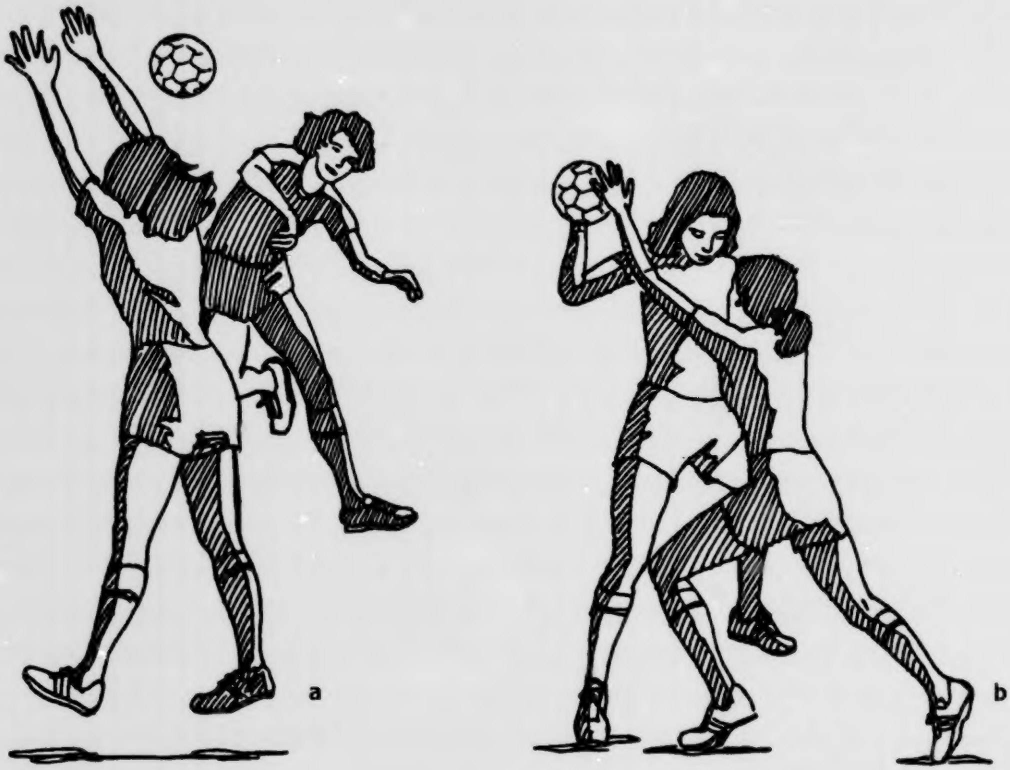
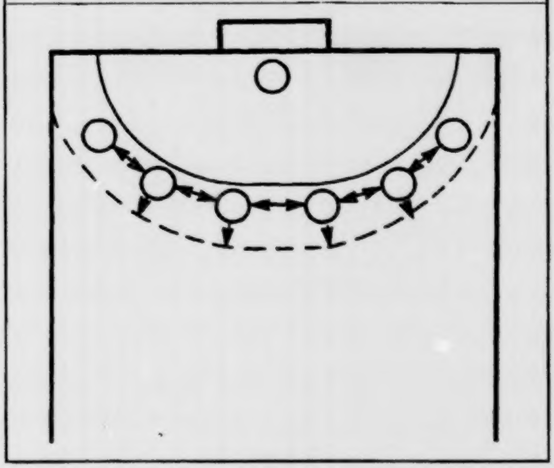


Diagram 12. 6-0 Defense



handball, for beginning players it is suggested that strict basketball defense be played. Gradually, as experience is gained, hand checking can be introduced and, finally, limited arm and body checking can be added.

The 6-0 is the basic defensive formation. Diagram 12 illustrates the positions of the defensive players and the paths of their checking and shifting responsibilities.

Remember, team handball defense is a basic combination zone that becomes player to player as the situation requires. Defensive players talk to one another repeatedly to assure that each player knows his/her responsibility and to keep close watch on the ever-changing position of the offensive circle runner. Defensive players shift along the goal area line as the strength of the offensive team shifts. Each defensive player must actively assume and announce responsibility for an offensive player. Defensive players should not exchange positions in providing defensive coverage. As the offensive team shifts positions in their movement, the defensive players just shift player responsibility. Team defense is a series of shifting, helping out, and recovery of position for the next threat. Playing defense in team handball requires full effort by each individual. Once control of the ball is obtained and the defensive team goes on offense, the team can pace their attack and dictate the intensity of play and in doing so, recover from the effort expended on defense.

Elements Of Defense

1. All defensive players should shift with the general direction of the ball. The defense focuses their strength on the location of the ball.
2. The defense should always strive to have $1\frac{1}{2}$ defenders on the ball. This requires movement and adjustment of responsibilities as the ball moves.
3. The defense should immediately identify an offensive opponent's shooting arm and "overplay" this shooting arm to make shot selection more difficult.
4. The defensive players should maintain a constant stream of "chatter" among one another so that defensive responsibilities can be announced and shifted with offensive player and ball movements.
5. If offensive players are attempting to move or cut for better positioning, it is important for the defense to either deny this position or obstruct the movement of the player so as to disrupt the timing of the offense.
6. Players should not waste energy by attacking/checking an offensive player who is not in a threatening position.
7. Proper defensive checking position involves having one hand attempting to control the offensive player's shooting arm and having the other arm placed at the hip opposite the shooting arm of the offensive player. This assures good defensive positioning of the body.
8. It is better to switch offensive opponents than for the defense to switch their own positions.
9. The defense should always anticipate passing lanes and shooting "windows" and be ready to block the ball at all times.
10. Transition from defense to offense is a key element in a successful fast-break attack, and speed is of the essence.

Resources for Continued Participation

USA Team Handball National Office

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www.usateamhandball.org

USA Team Handball: Junior Olympic Development Program

This program is multifaceted, with the objective of identifying and training the nation's top younger athletes. Teams created by age groups will feed directly into the national program and become our future Olympians. Over the next two years, USA Team Handball will create six junior and youth elite teams as part of the Junior Olympic Development Program (JODP). The teams will be one Junior National Team and two Youth Select Teams for both men and women. These teams will then be given the training and experience necessary for them to succeed internationally. The JODP is a regional program; the Southeast is the first in which development has taken place. Future plans include expansion to the West Coast, East Coast and Midwest starting in 2001. The JODP will consist of high-level training camps, coaching education, the USA Cup, the Junior World League, and the European Summer Tour.

For more information regarding JODP, contact Dannette Leininger at dannette@usateamhandball.org

Boys and Girls Clubs of America

http://www.bgca.org

Southeast Team Handball Conference

Men's West Division: Georgia Tech University, University of Georgia, Georgia Southern University, Middle Georgia College, Georgia State University, University of Alabama

Men's East Division: Furman University, Lander University, Benedict College, Presbyterian College, University of South Carolina, Carolina Team Handball

Women's Division: Furman University, Lander University, Presbyterian College, and Benedict College, University of South Carolina, University of Georgia

For more information regarding the SETHC, contact Lisa Eagen at lisaeagen@usateamhandball.org

Beach Handball

Rules: www-personal.monash.edu.au/~lipcsey/handball/rules/IHF-beach.html

U.S. Beach Competition

www.condorhandball.com/action/beach2000/index.htm

Team Handball: Special Olympics International

http://www.specialolympics.org/sports/index.html

USA Deaf National Team Handball Team

http://members.tripod.com/usadth/Default.htm

Miscellaneous team handball website with many team handball links:

http://members.nbci.com/sjswart/handball.htm
http://www.teamhandball.org

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CHAPTER 21

Tennis

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Introduction

Tennis can be traced back to 11th-century Italian and Franciscan monks who played *jeu de paume* (game of the palm), in which players hit a ball back and forth over a net on an indoor court with their palm. Rules varied to suit players and playing conditions and kept changing as the monks traveled to and from monasteries. The game was soon banned by the Pope because the monks enjoyed playing it so much!

In the 13th century, the French played "Tenez" (meaning "Play"), in which a person wore a glove with cords woven in and out between his/her fingers to hit the ball across the net. The ball had a hair, wool, or cork center, which was covered in cloth, tightly bound in string, and wrapped in felt. The balls were hand-stitched and lasted two weeks.

By the 14th century, only noblemen played the game. Players were allowed to hit the ball off walls and onto ledges that surrounded the court on three sides. The court was oblong, and the net stretched across the court and measured 5 feet at the sides and 4 feet in the middle. Unfortunately, gamblers became interested in the sport and the game fell into disuse and was then abandoned for 300 years.

In 1873, Major Walter Clopton Wingfield of the British Army invented *Sphairistike* (Greek word meaning "ball-play"). It was played on a grass court shaped like an hourglass, with the net 7 feet high at the sides. A wood racket with a sheep-gut-strung head was used to improve a player's reach. The major created and published the rules and patented the game and its equipment, calling it "Tennis-on-the-lawn."

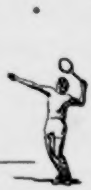
The game became popular in Europe, and, by 1875, the All England Croquet Club, located at Wimbledon (a suburb of London), found itself in financial difficulties because people were playing the less expensive lawn tennis and not croquet. Seeking a way out of financial duress, they attracted new members by building several tennis courts on their croquet lawns. They standardized the tennis court to 78 feet by 27 feet (the present dimensions) and put the net at 3 feet in the center. The first championship was held at Wimbledon in 1877. The club changed its name to the All England Lawn Tennis and Croquet Club and is today referred to as just the All England Club.

In 1874, one of the major's military friends took the game back to Bermuda where he was stationed. Mary Ewing Outerbridge, a New Yorker, was vacationing on the island and tried the new sport. She liked it and brought the equipment home with her.

Mary was a member of the Staten Island Cricket and Baseball Club. She was given permission to create a court in an unused portion of the grounds. The game became very popular, and soon tennis courts popped up in Newport and Lakewood, New Jersey. However, the sport was a pursuit for the rich because they had country houses with ample lawn space to create a court and enough time to develop the skills and learn the game.

In 1881, Mary's brother E. H. Outerbridge called a meeting of all clubs interested in or devoted to Lawn Tennis. Thirty-three clubs were represented, and, from them, the United States Tennis Association (USTA) was born and is still the governing body of the sport today. A standard code of play (i.e., rules) was developed as an outcome of this meeting.

Later that same year, the first National Championship for the United States was held in Newport, Rhode Island. In 1915, the Championship moved to Long



Island and in 1975 relocated to Flushing Meadows, New York, where it remains today. The tournament is now called the U.S. Open and is considered one of the four most prestigious in the world (the Australian Open, French Open, and Wimbledon represent the other three prestigious tournaments).

From 1896 to 1924, men's singles and doubles tennis were included in the Olympic games. It was not until 1988 that tennis returned to the Olympics with professional players being allowed to participate.

Other tournaments included The Davis Cup, created by Dwight Davis, a tennis player from Harvard University in 1900, as a competition between the United States and Great Britain. In 1920, Hazel Hotchkiss Wightman created the Wightman Cup between the women of the United States and Great Britain. The Wightman Cup was played up until 1989, ending with the United States winning 51 of the 61 games played.

From 1900-1920, all players were considered amateurs. That is, they were not paid prize money when they won a tournament. They were, however, given money to help pay for hotel and travel expenses.

This changed in the 1920s when players traveled around the country playing before small crowds. The money earned was from the ticket sales divided into the number of players in the tournament.

In 1967, Lamar Hunt started offering large sums of money to winning tennis champions. In 1968, the officials at Wimbledon realized their event was going to be without the world's best players because they did not pay players, and so they also agreed to start paying the tournament winners. As soon as Wimbledon offered prize money, all of the other tournaments did as well.

Today, tennis is one of the most popular sports played by amateurs, professionals, and recreational players alike for the following reasons:

1. It requires just two to four players to participate in game play.
2. It can be played indoors or outdoors.
3. No physical contact is made during game play.
4. The game can be as strenuous as the players want it to be.
5. The equipment is relatively low-cost.
6. The availability of courts (in school yards, public parks, etc.).
7. Gender and age are irrelevant (anyone at any age can participate).

Terminology

Ace. A serve that is not touched by an opponent.

Ad-In. Score when the player serving has won the point after the score was deuce.

Ad-Out. Score when the receiving player has won the point after the score was deuce.

Alley. Lane on each side of the singles court that can be used after the serve in doubles.

Approach Shot. Shot that the hitter follows to the net.

Backcourt. Part of the court between the service line and the baseline.

Backspin. The spin put on a ball that makes it bounce back toward the hitter.

Baseline. The boundary line at the back of the court that runs parallel to the net.

Break (Service Break). To win a game that the opponent serves.

Center Service Line. The line perpendicular to the net dividing the two service courts.

Cross-Court. A shot hit diagonally from one corner of the court to the opposite corner.

Deep. A shot bouncing near the baseline on groundstrokes and near the service line on serves.

Deuce. A tie score at 40-40 and each tie after that in the same game.

Double Fault. When the server does not hit either of his/her two attempts into the proper court, resulting in loss of point for the server.

Down-the-line Shot. A ball hit across the net parallel to the sideline.

Drive. A groundstroke hit with power deeply into the opponent's backcourt that lands near the opponent's baseline.

Drop Shot. A deceptive shot hit softly that barely clears the net and bounces close to it.

Fault. When an attempted serve does not land in the proper service court.

Foot Fault. When the server's foot touches any area other than behind the baseline within imaginary extensions of the center mark and sideline.

Flat. A shot hit with little or no spin.

Forecourt. The area of the court between the net and service line.

Game. A unit of a set completed when one side wins four points before the other side wins three, or, if both sides have won three points, when one side thereafter gains a two-point margin.

Groundstroke. A forehand or backhand stroke that is hit after the ball has bounced.

Half Volley. A shot hit immediately after the ball has bounced on the court.

Let. A serve that hits the top of the net and bounces in the proper service court.

Lob. A high, arching shot hit over an opponent's head (offensive) or a shot to gain more time to get back into position (defensive).

Love. A word used meaning zero points.

Match. A contest between two players, two doubles teams, or two teams representing schools, clubs, or other groups.

Match Point. Point that, if won, allows a player to win the match.

Midcourt. The area in front or in back of the service line of the playing court.

Net Game. A person's technique for play in the forecourt.

No-Ad. A scoring system in which the first player to win four points wins a game. The score is counted 1-2-3-4 instead of 15-30-40.

No-Man's-Land. The area between the baseline and service line. A player caught here is vulnerable to balls landing at his/her feet.

Poach. Movement of a player at the net in front of his/her partner to hit a volley.

Rally. A series of hits (usually groundstrokes) between players.

Receiver. The player who returns the serve.

Serve. Overhand hitting action to begin each point.

Service Break. A game won by the receiver.

Service Line. The line that is parallel to and 21 feet from the net.

Set. Part of a match when one player or team has won at least six games and is ahead by at least two games. The set may continue until one player is ahead by two games, or a tie breaker may be played when each player has won six times.

Set Point. Point that, if won, allows the player to win the set.

Sideline. The boundary line that runs from the net to the baseline. The singles sidelines are closer to the center of the court than the doubles sidelines.

Slice. Motion of the racket head going around the side of the ball, producing a horizontal spin on the ball.

Smash. Hitting the ball downward into the opponent's court with great force.

Split Step. A jump stop maneuver a player uses to prepare for a volley at the net.

Tie Breaker. A method of completing a set when both players, or a team, have won six games. Nine-point (best of nine) and 12-point (best of 12) tie breakers are the most commonly used.

Topspin. The spin put on a ball by a racket when the ball spins or rolls forward.

Volley. A shot hit before the ball bounces on the court.

Fitness Requirements

To play good tennis (i.e., play energetically for the entire length of a match), you need to condition yourself physically. Therefore, your training program should develop and maintain your cardiovascular endurance, agility, strength, and flexibility and should be based on three principles: specificity, overload, and interval training.

The theory of specificity holds that any attribute (i.e., quickness, speed, strength, endurance) is developed best by practicing the actual skills or movements used in the sport. Therefore, spend a lot of time practicing the actual footwork and racket movements used in game play. In addition, run for conditioning in a manner similar to the way you would run in game play.

As you exercise and begin to tire, remember the theory of overloading: you must tax your muscles by performing exercises that require an output beyond that needed during the game. This will create a reserve that you can tap in an emergency without hindering your ability to maintain a steady pace throughout a match.

The third principle, interval training, suggests you alternate periods of vigorous effort with rest periods. These periods should follow in quick succession. By gradually increasing the length of the work period or the speed at which you do the work, you will increase the amount of work done. The result: increased endurance for that kind of work.

Finally, remember you must get an adequate amount of sleep and rest and must eat the proper amounts of protein, carbohydrates, fats, vitamins, and minerals. Avoid rich, starchy foods and sweets that offer only quick energy and very little nourishment. Disregarding any of these items will minimize the effectiveness of your conditioning.

Cardiovascular Endurance

Running is one of the ways you can increase your cardiovascular endurance. While running, alternate periods of vigorous effort and rest periods in quick succession. For example, sprint for 30 yards and then either rest or run slowly between sprints. Gradually

increase the length of time you sprint or decrease the length of the rest period. Do this routine regularly for a period of several weeks, and you will increase your endurance for that kind of running.

Another training method requires you to run around a gym or a track. As you run, make the kind of quick stops, starts, and changes of direction that occur in game play. For example, run for 10 yards, make a split stop, and then lunge first to your left and then to your right as if reaching for wide volleys. Recover to the ready position, sprint forward 10 yards, and repeat the process. Continue this way until you are fatigued.

"Spot running" is a third method designed to develop agility and endurance. Run in place slowly for 50 counts (one count each time a foot touches the ground). Then run as fast as you can for 50 counts with your feet barely leaving the ground. Alternate running fast and slow. As you develop strength and stamina, gradually raise your knees higher in the slow part of the exercise and lengthen the time of each running period. You may need to rest a short time between running periods.

Agility

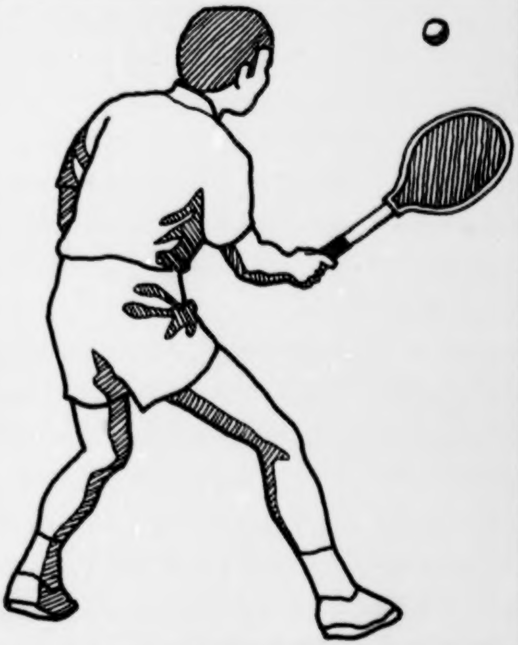
Agility is the ability to move quickly and easily and is an asset in tennis. Here is a list of exercises that develop agility. Try all of them to find which you prefer and want to use regularly.

1. Skip rope.
2. Run up and down stairs.
3. On a flat surface, run backward and then forward, with quick stops and changes of direction.
4. Stand on the center service line on a tennis court. Move sideways to your right and touch the right sideline. Quickly reverse direction and move to your left until you reach the left sideline. Continue to move sideways back and forth between the sidelines, moving as fast as possible.

Strength In the Hand, Wrist, And Forearm

The most efficient way to develop strength in your hand, wrist, and forearm is to hit the ball against a wall with a covered racket (Figure 1). The added weight of the cover and the air resistance it causeswill teach you to hold your racket firmly. This also develops the strength you need to play well. If you are able to volley the ball against the wall, do so. This will require and build more strength than if you let the ball bounce before hitting it.

Figure 1. Hitting Against the Wall with a Covered Racket



To develop the wrist strength you need for serving, serve the ball against the wall with a covered racket. You will feel the air resistance even more than with the groundstrokes or volleys. As you learn to use your wrist and fingers to force the racket through, you will improve your ability to generate racket speed when serving.

Abdominal Strength

Here are four exercises for keeping your abdominal muscles toned.

1. Sit on the floor, legs extended in front, with your heels held just off the floor. Keep your hands on the ground by your side to help maintain balance. Draw your left knee in toward your chest and then extend it. While extending your left leg, draw the right knee in toward your chest and then extend and straighten that leg. Continue to alternate, drawing your knees in and extending them and moving your feet in a circular pattern (like you are riding a bicycle) until you get tired.
2. Sit on the floor, legs extended in front of you. Raise both feet off the floor, lean back slightly at the waist, and raise your arms above your head. Balance on your buttocks and lower back while your legs are slanted upward at a 45-degree

angle. Hold the position for as long as you can. Relax and repeat ten times.

3. Jump upward and draw both knees up and toward your chest. Make several consecutive jumps until you are tired.
4. In correct sit-up position (i.e., on your back, hands crossed on chest, knees bent, feet flat on the floor), contract your stomach muscles and raise your upper body to about 45 degrees. At this angle, twist your body so your left elbow touches your right knee. Return to center position and lower your torso down to a position where the lower back is just touching the ground. (Do not lower your body all the way to the ground or all the way up to a sitting position. These two positions do not contract the abdominal muscles. Contraction throughout the entire range of motion is needed for stronger abdominal muscles). Contract your muscles again and raise your torso to 45 degrees, twisting your torso so your right elbow touches your left knee. Return to center position and lower your torso down. Continue to alternate left and right elbow touches to your knees until you are tired.

Leg Strength

Stand with your back flat against a wall, with your heels about six inches from the wall. Bend your knees to lower your body while keeping your trunk straight and your back pressed against the wall. Lower to a half knee-bend position (so it looks like you are sitting in an invisible chair) and hold the position until you are tired. Then straighten your legs to raise your body. Repeat the entire process until you are tired.

Flexibility

Flexibility refers to the ability of the muscles, tendons, and ligaments around a joint to move while providing support and allowing the joint to move smoothly through its entire range of motion. Increased flexibility reduces the risk of injury to the muscle when the limb is moved suddenly.

Before conducting any flexibility exercises, you should first warm up the muscles by performing some form of cardiovascular exercise (e.g., jogging). This increases the blood flow to the muscles and reduces soreness.

When performing flexibility exercises, it is important to do the following:

1. Move slowly throughout all phases of the exercises.
2. Move into the stretching position slowly until a mild tension is felt. Do not bounce because bouncing injures the muscle.
3. Hold the stretch for 15 to 20 seconds. Increase the time as you gain flexibility.
4. Breathe. Do not hold your breath while performing the exercises because it can cause injury.

The following exercises are designed to help you develop and maintain flexibility of the various joints in the body.

1. **Shoulder**: Grip the racket so your left hand is holding the racket head and the right hand is holding the handle. Elevate your arms above your head. Bend your waist toward the left, stretching the right shoulder. Your knees should be slightly flexed. Hold for 15-20 seconds, return to your starting position, and repeat 10 times on both sides of the body. You can also stretch your shoulders by moving your extended arms behind your head.
2. **Trunk**: Sit down on the floor with your legs crossed. Twist your body to the right. Place your hands on the right side of your thigh. Hold for 15-20 seconds, return to the starting position, and repeat on the opposite side. Perform this exercise 10 times.
3. **Lower back**: Lie on your back with your legs straight and together. Bring both knees to your chest. Grasp just under your knees and pull them toward your armpits with your arms. Hold for 15-20 seconds, return to your starting position, and repeat 10 times.
4. **Hamstrings**: Sit on the floor with your legs straight and together. Extend your arms forward toward your toes. Stretch to or beyond your toes until you cannot go any further. Hold for 15-20 seconds, return to your starting position, and repeat 10 times.
5. **Heel cord, gastrocnemius, soleus**: Stand facing the wall with your palms against the wall and your body at arm's length. Your feet should be spread slightly. Keeping your feet flat and body straight, lean forward so that your elbows bend and touch the wall or until you feel a stretch in the calf muscles. Hold for 15-20 seconds, return to your starting position, and repeat 10 times.

Skills

Gripping the racket

A person needs to have some basic skills in order to play tennis. Learning how to grip the racket and how to get ready to hit the ball are skills that must be learned first because they are the basis for all other tennis skills.

There are five grips a person can use: the eastern forehand, the eastern backhand, the continental forehand/backhand, the western forehand, and the two-hand backhand. Deciding which grip is best for you depends on three factors: (1) the type of stroke you are hitting, (2) which feels the most comfortable, and (3) which is the most effective.

The eastern forehand grip (also known as the "shake hands" grip) is a universally used grip designed for the forehand groundstroke and is used by players who stay at the baseline and hit groundstrokes. To execute this grip, shake hands with the racket's grip. As your hand grasps the grip, your fingers will be spread along the length of it with the index finger spread the farthest in a "trigger finger" style (Figure 2), providing control. The thumb will rest on the backside of the racket. The thumb and four fingers will form a "V" on the racket grip that points to the racket shoulder when you hold the racket in front, at a right angle to your body (Figure 3).

The eastern backhand grip is used for backhand groundstrokes and for special serves. Starting from the eastern forehand grip, roll your hand over the top of the grip and place your thumb diagonally across the rear plane of the grip. You should see all four knuckles of the racket hand from this position while holding the racket perpendicular to the body (Figure 4). The "V" formed by the thumb and fingers will point to the nonracket shoulder when the racket is held in front of the body.

The continental forehand and backhand grips are used for groundstrokes, net play, and serving. The continental grips also require little grip adjustment for different strokes. Consequently, the strokes are disguised when using this grip. When a player is serving, the continental grip provides control, accuracy, and power. It is also recommended that a player maintain a continental grip for play at the net to avoid mishitting the ball and being confused as to what grip to use next while at the net.

To perform the continental grip, place your dominant hand midway between the two eastern grips. The

Figure 2. Trigger Finger Position

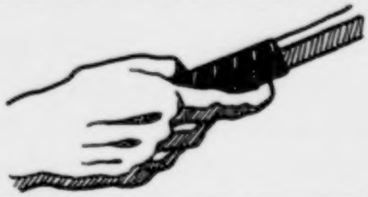


Figure 3. Eastern Forehand Grip (Top View)

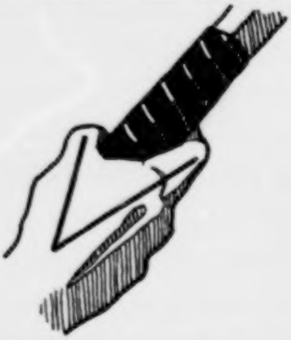


Figure 4. Eastern Backhand Grip (Top View)

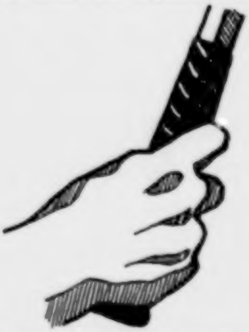
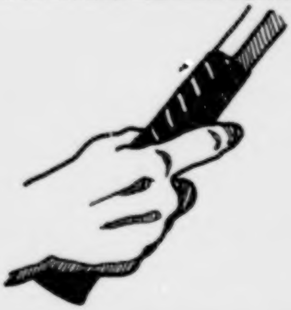


Figure 5. Forehand/Backhand Continental Grip (Top View)



"V" points to the middle of the body when the racket is held out in front (Figure 5). The difference between the forehand and backhand grips is that, in the forehand grip, the thumb grasps the racket grip, whereas in the backhand, the thumb is placed diagonally across the rear of the racket grip.

The western forehand grip is used for topspin forehand groundstrokes. The grip is achieved by laying the racket on the court and picking it up naturally. The palm of the hand lies flat against and under the backside of the racket grip. The "V" when the racket is held in front of the body points beyond the racket shoulder (Figure 6).

The two-hand backhand is a useful grip, particularly with individuals who lack the strength to hit using the other grips or who are seeking more power and control for their groundstrokes. A disadvantage in using the grip is that it limits a player's reach for wide shots. When executing the two-hand backhand grip, the hand on the racket side grasps the racket grip in either a continental or an eastern backhand grip. The other hand is placed above in an eastern forehand grip (Figure 7). The two-hand backhand grip requires the two hands to work together to execute the stroke.

Ready position

Ready position means squaring your feet to the net, holding the racket out in front of the body with the racket pointing toward the opponent or slightly toward the backhand side (a right-hander's left side), bending your knees, and leaning forward. Use the nonracket hand to support the racket's shaft (between the head and the grip). You should be watching the ball leave your opponent's racket and expecting the ball to come over the net (Figure 8).

Groundstrokes

A groundstroke is a shot hit after the ball bounces on the court. A forehand groundstroke comes toward the side of your body where you hold your racket. It is the most frequently hit shot in tennis. The backhand groundstroke comes toward the side of the body opposite that on which you hold your racket. Although it is a natural stroke for some players, the backhand is generally considered to be harder to learn and a potential weakness for opponents to exploit.

Forehand

Grasp the racket using the eastern forehand grip. When you see the ball coming to the forehand side, begin the backswing. That is, bring the racket back in a straight line parallel to the court. The racket should be a little

Figure 6. Western Forehand Grip (Top View)

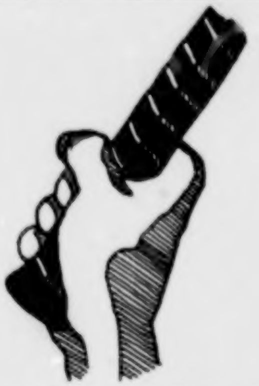


Figure 7. Two Hand Backhand Grip (Top View)

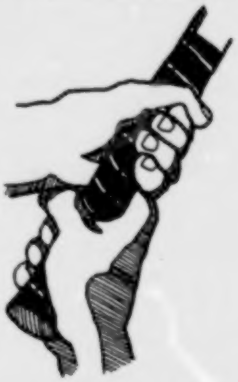
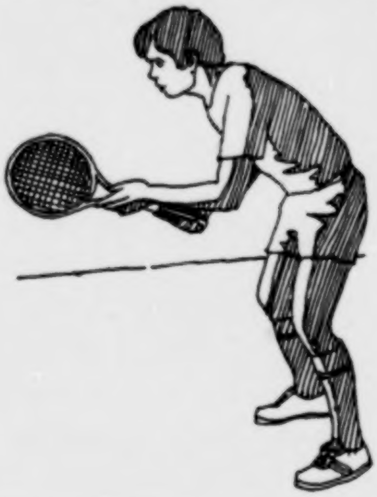


Figure 8. Ready Position

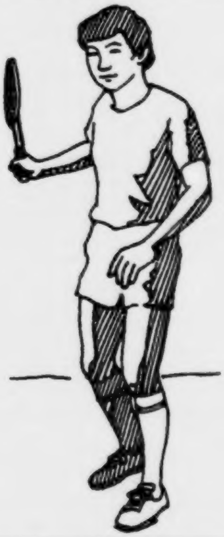


lower than waist high and should point to the fence behind the baseline (Figure 9). The racket head should not be seen by the person standing in front of you. Do not wait until after the ball bounces to perform the backswing because this does not allow enough time to adjust to unexpected bounces, spin, or velocity.

As the ball travels over the net, move your opposite shoulder so it points to the ball and your feet so they are parallel to the sideline. Use the foot furthest away from the net to push off and transfer your weight forward as you begin to swing at the ball (Figure 10). Move the racket upward during the forward swing. This action puts some topspin on the ball, which makes for consistent strokes and causes the ball to bounce high on the other side of the net. Furthermore, make contact with the ball just before it reaches the midsection of your body, keeping your wrist firm (i.e., do not let your wrist move during the swing). After the hit, follow through by reaching out toward the net. It should cross the front of your body and finish high, pointing in the direction of the shot (Figure 11).

Every time you hit a forehand, the total action in the swing should be about the same. If the ball comes lower than your waist, bend your knees, keeping your back straight, and use the same motion. Do not stand straight up and "golf" the ball. If the ball bounces deeply in the backcourt and high to your forehand, retreat quickly, plant your back foot, and move your weight forward with the swing. If a ball falls short in your court, move up, plant, step, swing, and follow through.

Figure 9. Forehand: Backswing



Backhand

There are three ways to hold the racket for backhand shots: (1) the eastern backhand, (2) the continental backhand, and (3) the two-hand backhand. Regardless

Figure 10. Forehand: Shift Weight Forward

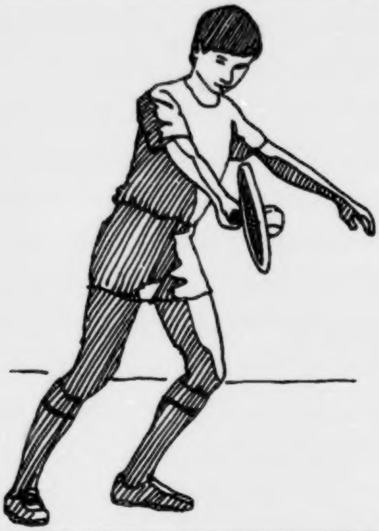
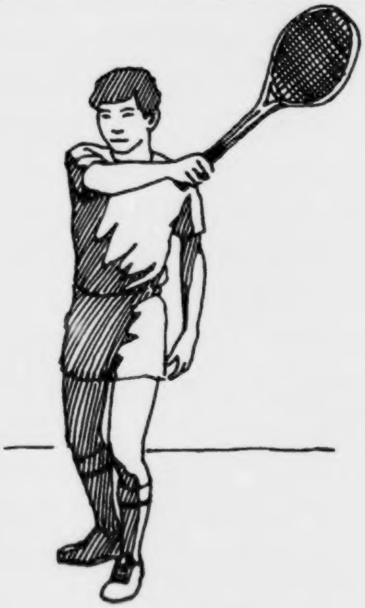


Figure 11. Forehand: Follow-through



of the grip, take the racket back as soon as the ball leaves the opponent's racket. Use your nonracket hand to cradle the shaft throughout the entire backswing, unless you are using a two-handed stroke. As the racket goes back, rotate your shoulders so your opponent can see your back. Bring the racket back parallel to the court (Figure 12).

Before you contact the ball, point your opposite shoulder in the direction of the target. Bend your knees slightly. The foot closer to the net should point toward the sideline or at a 45-degree angle to the net. For added power, take a small step forward with the foot closer to the net just before you make contact. Lean forward with the swing (Figure 13).

Swing parallel to the court. For topspin, start the racket head lower and swing upward. For backspin, start the racket head a bit higher than the waist. In either case, your wrist should be firm throughout the swing. The racket head should always be higher than your wrist on all but very low shots. Contact the ball even with, or in front of, the foot closer to the net, which will give you more power. Two-handers can wait longer to make contact. Follow through out toward the net, across the front of your body, and up (Figure 14).

Beginner's Serve

The serve is used to begin a point and must be delivered behind the baseline. Hold the racket with an

Figure 12. Backhand: Set-up

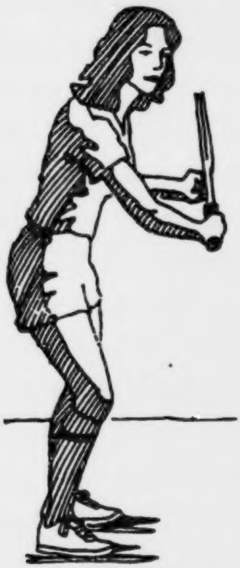


Figure 13. Backhand: Contact

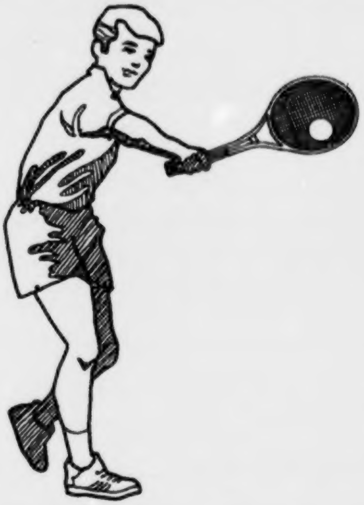
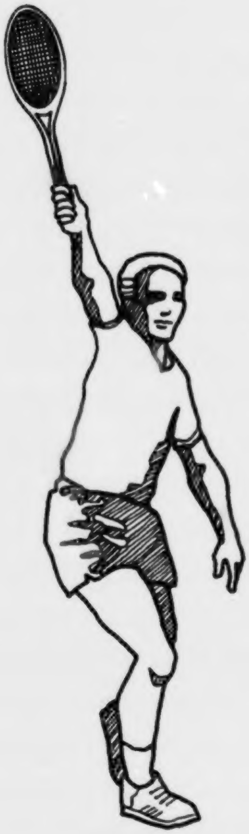


Figure 14. Backhand: Follow-through



eastern forehand grip. Stand at a 45-degree angle to the net, facing one of the net posts with your weight on the foot that is away from the net. Lift the racket above your head, keeping the elbow at shoulder level (Figure 15).

Toss the ball slightly higher than you can reach with your racket, keeping one foot in front of you. If the toss is not where you want it to be, catch the ball or let it drop to the court and start again. The ball should go up without spin as it is released because spin causes a loss of control.

Reach high as you swing at the tossed ball. Your arm and racket should be fully extended when contact is made (Figure 16). It is important that the serving motion goes up at first rather than forward. Keep your elbow high until after the hit. As you hit, your racket moves up and forward. After contact, the racket continues forward (toward the net) as far as it can go. The rest of the follow-through should be across the front of your body, ending low on the opposite side from which the motion began (Figure 17).

Intermediate/Advanced Serve

Intermediate/advanced serves are usually performed using a continental grip because they enable the server

Figure 16. Beginner Serve: Contact

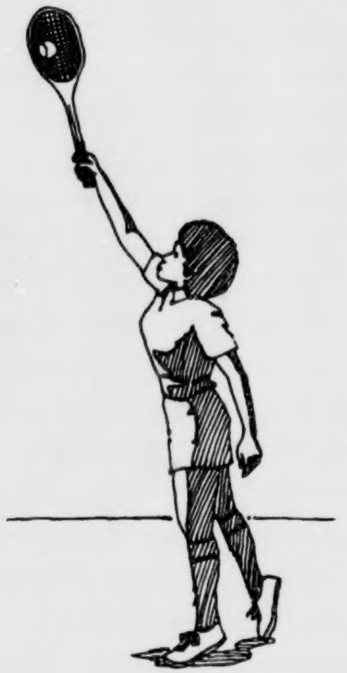


Figure 15. Beginner Serve: Starting Position

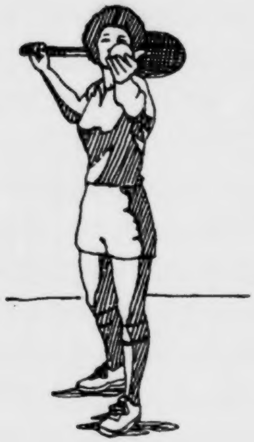
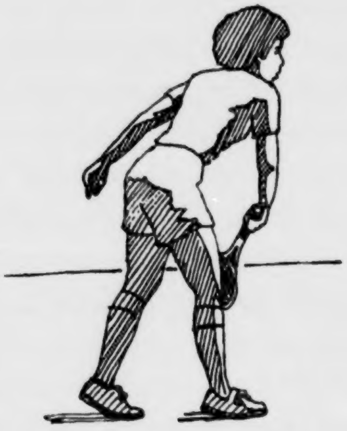


Figure 17. Beginner Serve: Follow-through



to hit with control, pace, and spin. To execute the serve, stand at a 45-degree angle to the baseline as described for beginners, but begin motion with the ball near the strings of the racket out in front of your body about chest high, with the racket pointing toward the target (Figure 18). Drop the racket in a pendulum motion by the side of your leg and at the same time drop the tossing hand prior to the toss. The arms should work together in unison—down together and up together.

The racket arm moves up (Figure 19) and then behind the head (Figure 20), while the other arm begins to move up to lift the ball for the toss. Time the toss so the ball reaches its highest point the same time your racket is extended overhead to make contact (Figure 21). If the timing is not right, stop and start over. Toss the ball far enough in front so you lean forward and beyond the baseline as you hit (Figure 22). Keep your knees bent and head up. Look at the ball while you are tossing. Extend your arm fully to make contact with the ball. Follow through by reaching out towards the net and then let your racket cross in front, finishing with the racket down and on the opposite side of your body (Figure 23).

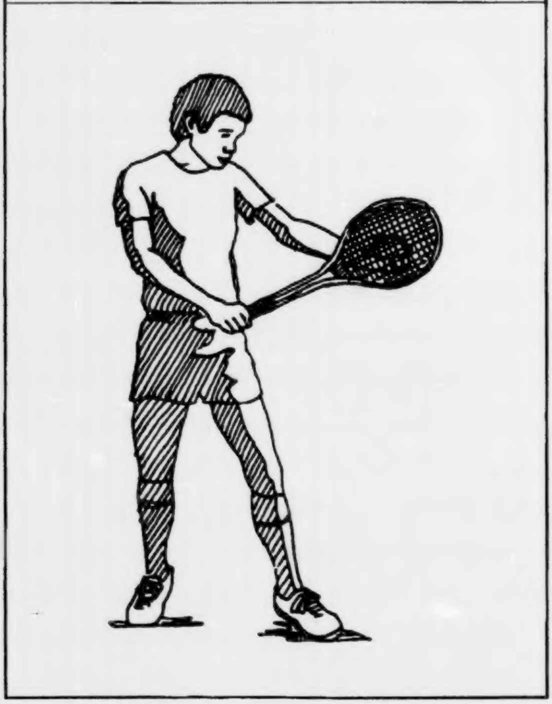


Figure 18. Intermediate/Advance Serve: Starting Position

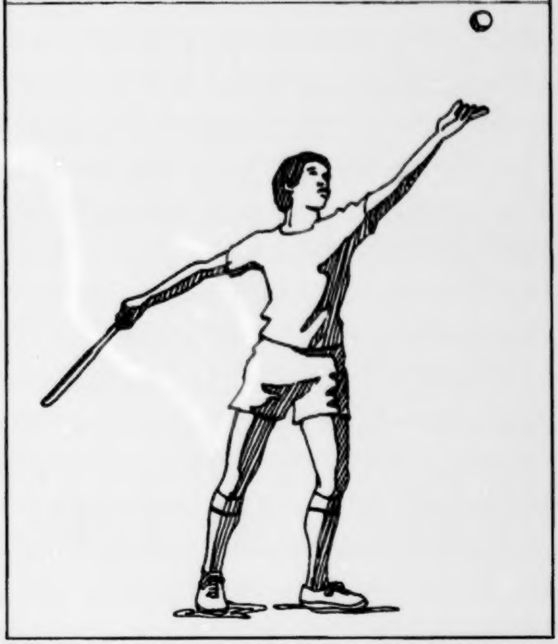


Figure 19. Intermediate/Advance Serve: Racket Arm Moves Up

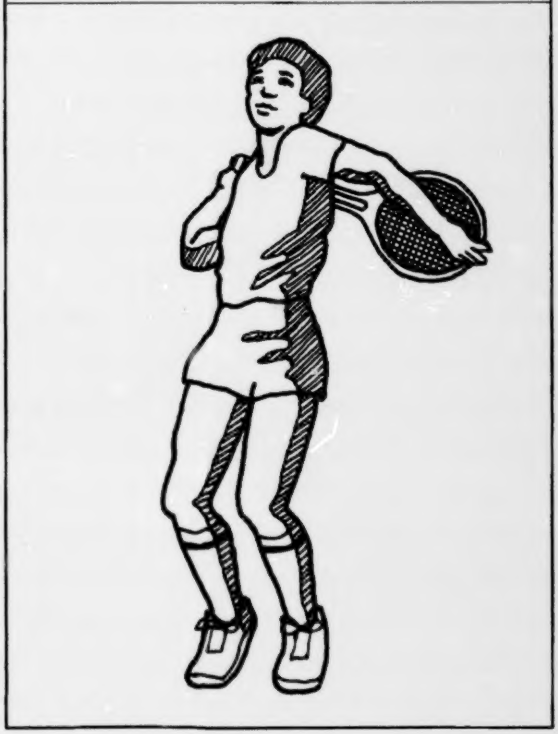


Figure 20. Intermediate/Advance Serve: Arm Racket Behind Head

Figure 21. Intermediate/Advance Serve: Ball at Highest Point, Racket Extended

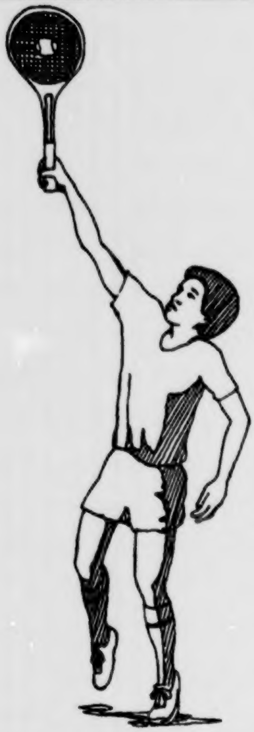


Figure 22. Intermediate/Advance Serve: Lean Forward & Beyond Baseline

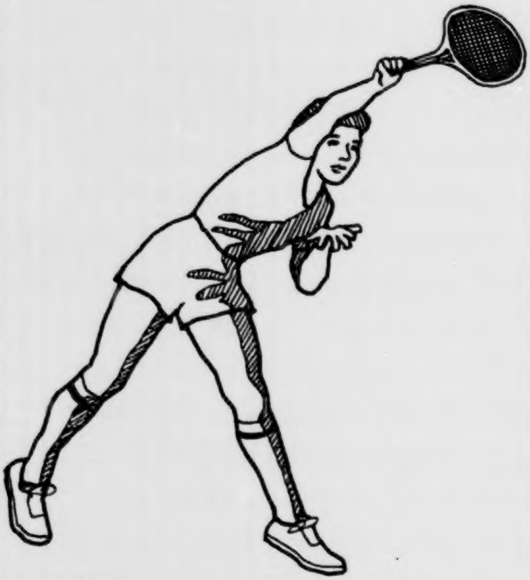
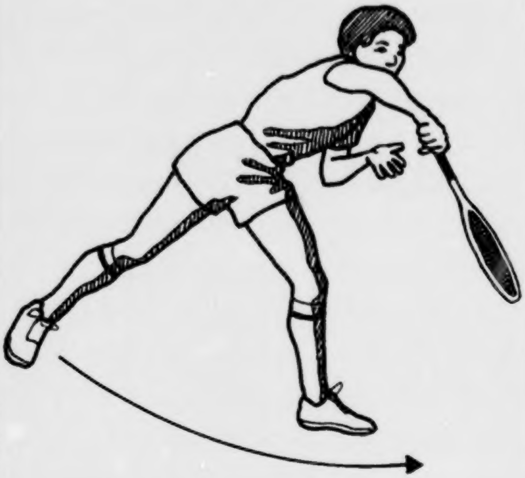


Figure 23. Intermediate/Advance Serve: Follow Through



Volley

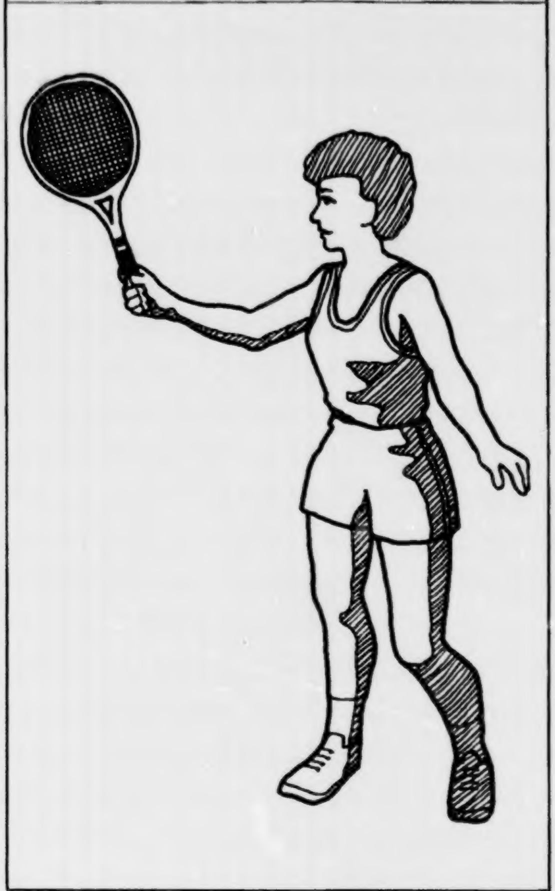
The volley shot is hit before the ball bounces on your side of the court. It is used when you move up to the net and have no choice but to use it, or when you want to hit the ball out of your opponent's reach when he/she is positioned near the net.

When executing the volley, beginners use the eastern forehand grip for forehand shots and the eastern backhand grip for backhand shots. Advanced players use the continental grip so they do not have to switch grips during the match.

Stand in the ready position 8-10 feet from the net. The racket should be directly in front of your body, with your arms extended. Your weight should be forward. Bend your knees and waist slightly forward. As the ball approaches, you want to be in a position to spring out for the shot.

If the ball comes to your right side, pivot on your right foot, and step forward in the direction you want

Figure 24. Volley: Short Backswing



to hit with your left foot. If the ball comes to your left side, pivot on your left foot and step across and into the ball with your right foot. If the ball comes directly at you, slide to one side by pushing off with one foot and stepping at an angle toward the net with the other.

The backswing is short because there is not enough time for a full backswing (Figure 24). As you see the ball coming, bring the racket back to a point even with your back and parallel to the net. Your wrist is at a 90-degree angle with your forearm. Lead the stroke with the racket head. Swing forward from your shoulder. Make contact in front of your body and hit the ball while it is rising (Figure 25). Direct volleys deep into the backcourt or at an angle to pull your opponent off the court. Follow through in the direction you want to hit but recover quickly for the next shot (Figure 26).

Figure 25. Volley: Contact in Front of Body

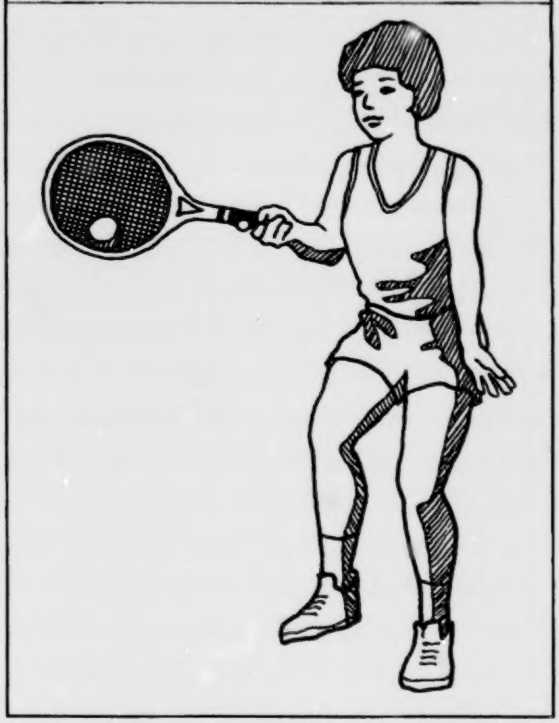
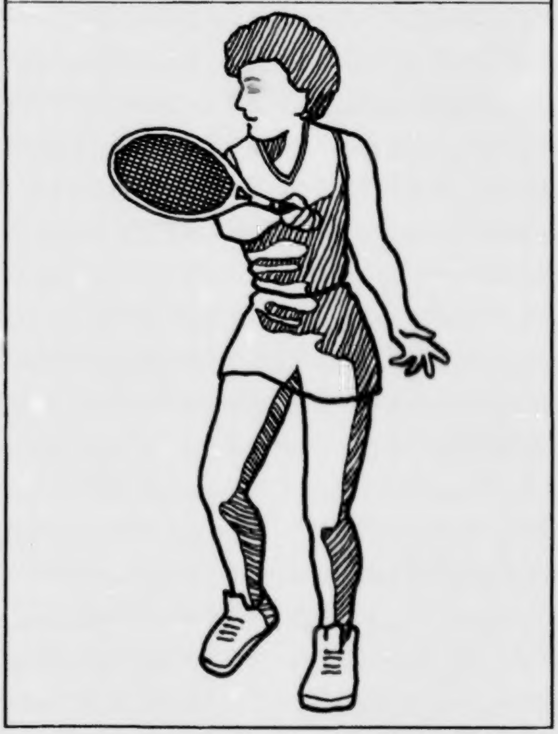


Figure 26. Volley: Follow-Through



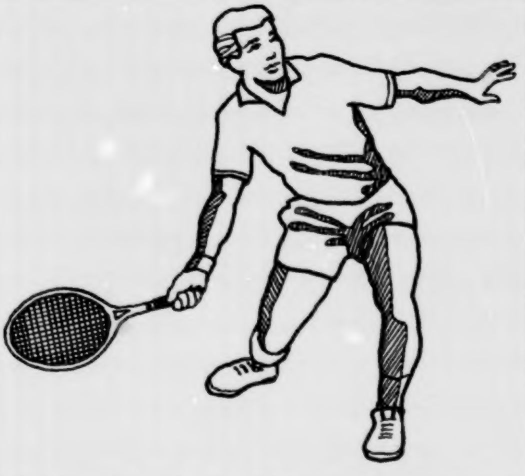


Figure 27. Lob: Racket Open

Lob

The lob is a high, arching offensive shot that goes higher, softer, and deeper into the backcourt than most groundstrokes. Hold the racket as you would for any groundstroke.

Just before you make contact with the ball, rotate your wrist so that the racket face opens slightly to the sky, allowing for backspin (Figure 27).

With the open face, lift the ball upward and aim it high enough to clear your opponent's outstretched racket (Figure 28). Direct the ball to the backhand side whenever possible. Hold the racket firmly, keep your wrist steady, and try to carry the ball on the strings as long as possible. Follow through in the direction you are hitting the ball with the racket held high (Figure 29).

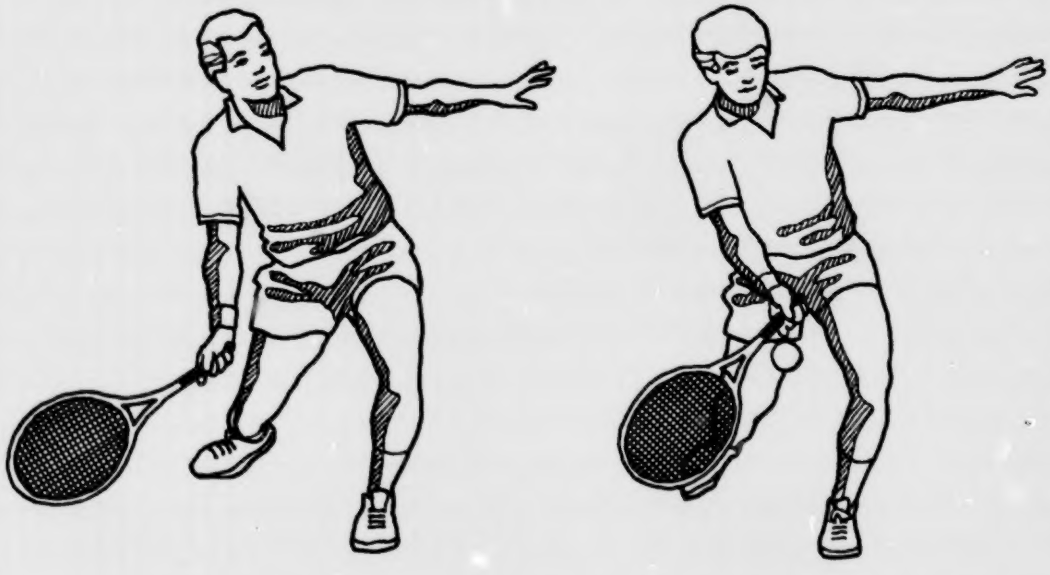


Figure 28. Lob: Lift Ball Upward

Smash

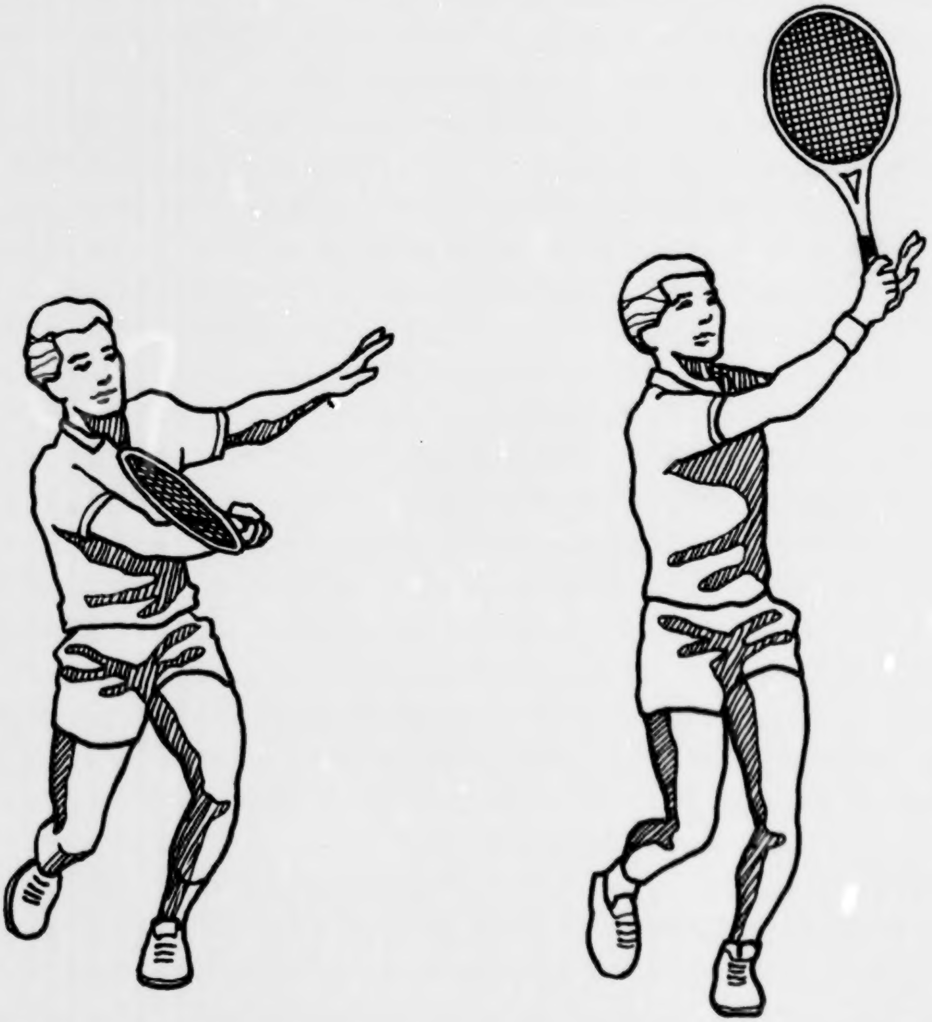
The smash is an aggressive, offensive, hard shot hit from the forecourt area after your opponent has lobbed the ball over your head. A good smash makes you a more intimidating opponent, which may help you win subsequent points.

Beginners use an eastern forehand grip. Advanced players use the continental grip. Rotate your wrist outward just before contact (so you are looking at the back of your hand). The thumb moves away from you, down, and across. This allows you to hit the ball flat (without spin) and with more force. Not rotating your wrist results in too much spin, which makes the ball go too far to the side and makes the ball move with less velocity.

Take several short half and quarter steps while preparing to hit. As soon as you see you can hit a smash, turn your side to the net. Right-handers put the right foot back and the left foot forward; left-handers do just the opposite. As you hit, push off with the back foot and transfer your weight forward.

As you prepare to hit, bring the racket up in front of the body to a position behind the head (like in the serve) (Figure 30). At this point, some players point to the ball with their opposite hand because they feel it improves concentration and makes them aware of

Figure 29. Lob: Follow Through



their position in relation to the ball. However, it is not an essential fundamental for this stroke.

Next, bring the racket forward and reach high to make contact (Figure 31). As you swing, move into the ball. Hit the ball at a point in front of your body. As you hit, rotate your wrist outward and snap down with the thumb (Figure 32). If you are close to the net, hit the ball with as little spin as possible to gain maximum velocity. Use some spin if you are in mid-court because this will make the ball curve down and into the court. Put more spin on the shot if you are in the backcourt because the distance between you and your opponent is too far for a flat shot to be effective. Follow through down and across your body and return to the ready position for the next shot.

Practice for Improvement

Practice in between playing matches is good for developing tennis skills. Listed below are drills you can perform by yourself and with a partner so you can engage in skill development situations that provide you

Figure 30. Smash: Bring the Racket Back

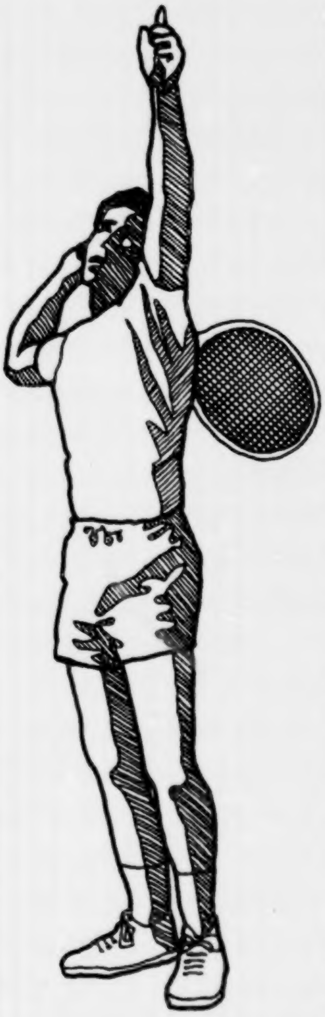


Figure 31. Smash: Racket Moves Forward and is up High

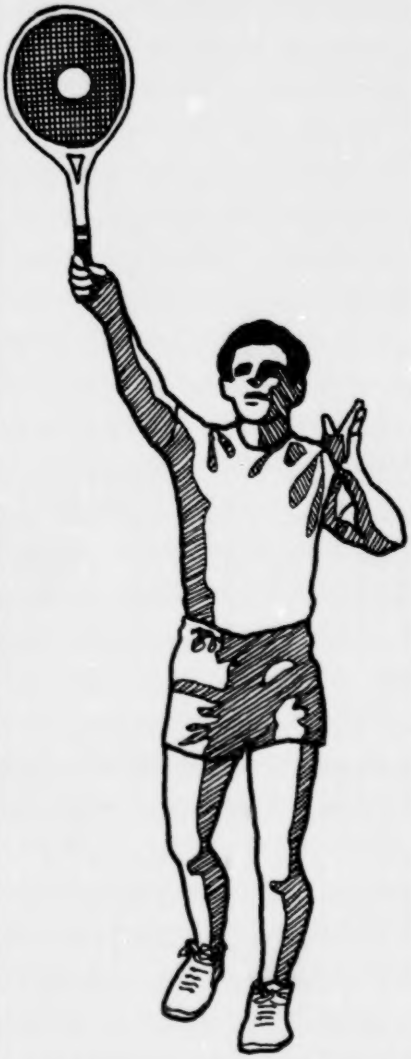
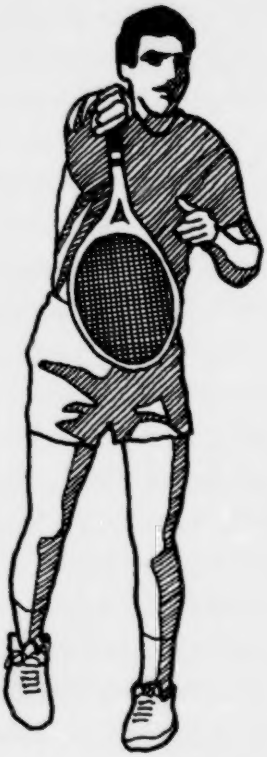


Figure 32. Smash: Snap Down



with the opportunity to test your skills and learn from your mistakes.

Groundstrokes

This drill is performed without a partner. Stand far enough away from a wall to allow the ball to bounce one time before each stroke. Perform each step for one minute. Return to the ready position after each stroke. While practicing, think about whether you (1) are keeping an eye on the ball, (2) are transferring weight into the ball, (3) have a full backswing and follow-through, (4) are hitting with the appropriate grip, (5) are hitting the ball so it contacts the wall at least 5 feet high (so you know it will clear the net), and (6) are hitting accurate shots.

1. Hit repetitive forehands.
2. Hit repetitive backhands (remember to self-drop on the backhand side).
3. Alternate forehand and backhand.
4. Repeat sets 1-3 with topspin.
5. Repeat sets 1-3 with backspin.

This next drill requires you to work with a partner and is called the bounce/hit drill. This drill encourages focus. Partners hit the ball from baseline to baseline without thinking about the mechanics of the stroke. You and your partner yell, "Bounce!" every time the ball bounces on the court (regardless of which side of the net the ball is on) and "Hit!" (regardless of which side of the net the ball is on) every time the ball is hit. This helps you focus on the ball and concentrate on the end result of hitting the ball to the other side of the court—and really develops your groundstroking skills.

Serve

This first drill is performed without a partner. You will be serving 30 tennis balls to each of the six targets for a total of 180 serves. While serving, keep the following points in mind: (1) look at the tennis ball on the toss, (2) keep your tosses accurate, (3) make sure your feet are behind the baseline and in proper position, (4) use a full backswing and follow through, (5) use the appropriate grip, and (6) try to serve the ball in the service court.

1. Serve 30 balls to the left service court, inside corner.
2. Serve 30 balls to the right service court, inside corner.
3. Serve 30 balls to the left service court, outside corner.
4. Serve 30 balls to the right service court, outside corner.
5. Serve 30 balls to the left service court—10 to the outside, 10 to the middle, 10 to the inside.
6. Serve 30 balls to the right service court—10 to the outside, 10 to the middle, 10 to the inside.

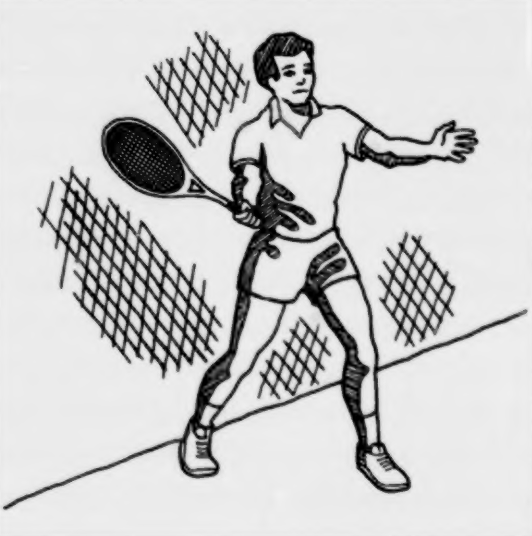
You will need a partner for this second service drill. One partner serves and the other returns the serve. The partner returning the serve focuses on hitting the ball deep to the baseline by hitting either cross-court or down-the-line shots. This makes the return more target-oriented.

Volley

Both of these drills require you to work with a partner.

1. **Toss to Volley Drill**: Partner 1 stands 20 feet on the other side of the net and tosses balls to Partner 2's forehand and backhand, alternately. Partner 2 directs his/her volleys anywhere in the singles court on the opposite side of the net. Practice for 15 volleys each side and then rotate positions.
2. **Back-to-the-Wall Volley Drill**: Partner 1 stands with his/her back against a fence or wall and returns volleys tossed by Partner 2 (Figure 33). Partner 1 should volley without the racket touching the fence or wall on the backswing. Therefore, he/she needs to get into the habit of moving forward to hit volleys. Switch roles

Figure 33. Back-to-Wall Volley Drill



after 20 consecutive volleys without touching the wall or fence.

Lob

You can perform the first lob drill by yourself. The second drill requires you to work with a partner.

1. **Drop-and-Hit Lob Drill**: Stand behind the baseline, drop the ball, and hit forehand lobs into the opposite court. Aim for specific areas in the backcourt, such as the forehand or backhand corners between the service line and the baseline. Use a full backswing and follow-through in this drill. You can also have a partner stand at the service line, holding his/her racket up as high as possible, and lob the ball over your partner's racket. Every lob should clear your partner's racket and land inside the baseline. Perform 10 lobs hitting both forehand and backhand lobs with a partner who is doing the same.
2. **Lob Drill**: Partners rally back and forth exchanging lobs. Emphasize hitting deep with proper height. Work on an equal number of forehand and backhand lobs and, as you progress, begin to place the lobs from corner to corner.

Smash

The first drill can be conducted by yourself. You will need a partner for the second drill.

1. **Toss and Smash Drill**: Stand near the net and toss a ball forward and high into the air. Get your racket back early, reach high, and smash the toss. Keep the ball in front of your body position and do not let it drop too low. Try to make the ball bounce high into the opposite court so an opponent would not be able to make a return.
2. **Lob/Smash**: Partner 1 stands on his/her own baseline, self-drops the ball and lobs it over the service court area to Partner 2. Partner 2 returns the lob with a smash. Play out the point with Partner 1 using lob shots and Partner 2 using smash shots. Change positions and/or shots after every 5-point game.

Safety

Even though tennis is a noncontact sport, a person can still get hurt. The most common tennis injuries include blisters, sprains, strains, cramps, shinsplints, and tennis elbow.

Blisters

A blister is formed when the two top layers of the skin are irritated, causing fluid to build up. Reduce the possibility and frequency of blisters by (1) playing shorter games, (2) making sure the racket grip is not too large or small, (3) keeping the racket handle dry, (4) putting powder in your shoes, (5) wearing padded socks or two pairs of socks, and (6) wearing shoes that fit. If you get a blister, clean and sterilize the area with alcohol or soap and water. Sterilize a needle (burn it with a lighted match) and make a small opening at one edge of the blister so the fluid can drain. Then put a bandage over the area.

Sprains

A sprain is an injury to a joint that usually damages blood vessels, ligaments, and tendons and is caused by forcing a joint beyond the normal range of motion. Symptoms include swelling, tenderness, discoloration, and pain. Sprains require rest. That means do not resume play or try to "walk it off." You also need to ice the injured area: 20 minutes on, 20 minutes off for the first 48 hours. Ice reduces the flow of fluid to the injury. Be sure to compress the area with a towel, tape, or an elastic bandage to reduce swelling. Finally, you will need to elevate the area to prevent fluid from entering.

Strains

A strain is a tear in the muscle and connective tissue and is caused by overexercising, sudden movement, fatigue, or not warming up properly. Symptoms include pain, soreness, and muscle spasms. Strains are treated by icing the injured area every 20 minutes during the first day after injury. After that, heat the injured area before playing and ice the area immediately after play.

Cramps

Cramps are involuntary contractions of muscles and are triggered by muscle fatigue, overexertion, and/or a chemical imbalance. Stretching and conditioning muscles is one way to combat cramps. Also replace the fluids that you lost through sweating: potassium, sodium, and water. Pressure, ice, and massages are an additional way to get rid of cramps.

Shinsplints

A shinsplint refers to pain in the front part of the lower leg and involves inflammation of tendons and muscles. Running on hard surfaces, poor warm-up/conditioning practices, inadequate arch support of the foot, and poor running techniques are all causes of shin splints. Treatment involves taping and elevating the arch, playing in good tennis sneakers, resting, and applying ice. You can avoid shin splints by gradually increasing practice sessions and by playing on cushioned surfaces.

Tennis Elbow

Tennis elbow (i.e., tendinitis) is an inflammation of the tendons/tissue around the elbow. It is produced when the forearm muscles are under a lot of stress or when a player uses improper hitting technique or a wrong racket. There are many different treatments available: ice, aspirin, rest, using a more suitable racket, and armbands.

Competition

Tennis is a game for two or four players. Using regulation tennis rackets, players try to score points by hitting a tennis ball over a net and out of an opponent's reach or by forcing the opponent to hit the ball outside the court. A coin toss decides which player serves and which player (or doubles team) begins at which end of the court.

Playing Area

(Diagram 1)

The court is 78 feet long by 27 feet wide for singles and 36 feet wide for doubles. It is divided in half by a net that is 36 inches high in the center and 42 inches high at the two supporting net posts. Service lines are parallel to and 21 feet from the net. They are 18 feet in front of the baselines, which are also parallel to the net and mark the outer boundary of each side of the court.

A center service line, parallel to the sideline, intersects the net and divides the service courts into two sections on both sides of the net. The center service line connects the two service lines. There are two service courts on each side of the net, covering the area between the net and service line and the center service line and the sideline. Each service court is 21 feet long by 13.5 feet wide. This area is also called the forecourt.

The backcourt is the area between the service line and the baseline. It is 18 feet long by 27 feet wide for singles or 36 feet wide for doubles. The court surface can be made of clay, grass, or composition.

Players

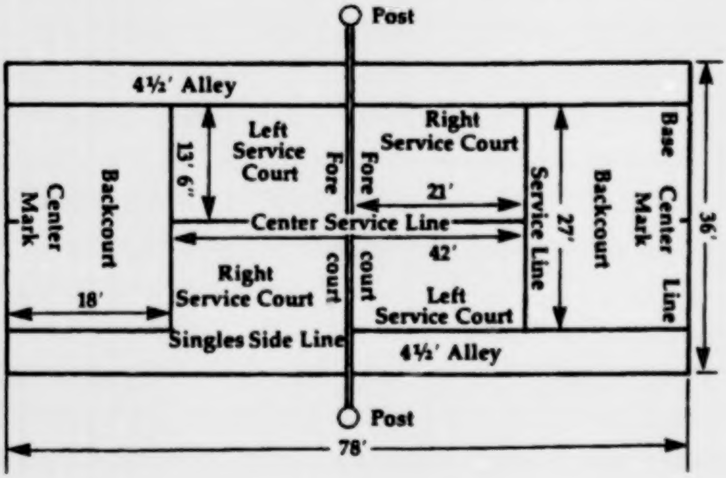
Tennis is played in singles matches (two players of the same sex) or doubles matches (four players). Doubles matches can be played as same-sex games (males against males; females against females), or mixed (a female and a male against another female/male team). The player who delivers the ball is called the server; the player receiving the serve is called the receiver.

Rules

The following are general rules for playing tennis:

1. The ball is hollow rubber, either white or yellow. It is 2.5-2.63 inches in diameter and weighs 2–2.1 ounces.

Diagram 1. Playing Court Dimensions



2. The racket may be up to 32 inches long and 12.5 inches wide. The strung surface, a pattern of crossed strings, may not be more than 15.5 inches long and 11.5 inches wide. Rackets are made of various materials and may be of any weight.
3. Players must serve from behind the baseline and anywhere in between the imaginary extension of the service mark and the singles sideline; players serve on the right-hand court to the service court diagonally opposite and then from alternate courts after each point.
4. Players keep the serve for a complete game and alternate throughout the set.
5. When a player is serving, the ball must be struck in the air by the racket before it hits the ground.
6. The server may catch the ball or let it drop without swinging before serving it.
7. When served, the ball must cross the net without bouncing and land in the receiver's service court.
8. A service fault occurs when the ball goes into the net, lands outside the receiver's service court, or is swung at and missed.
9. A foot fault occurs when the server steps on or over the baseline, serves from beyond the center mark, or runs or walks before hitting the ball.
10. If the first serve is a fault, the player is entitled to a second serve from behind the same half of the court. If another fault occurs, it is a double fault and the server loses a point.
11. A let is called if any serve touches the net but still lands within the service court, if it touches the receiver before it hits the ground, or if it was served before the receiver was ready. The serve does not count, and the player serves again. A let may also be called if play was interrupted.
12. Players switch ends of the court at the end of the first, third, fifth, and subsequent alternate games.
13. Play is continuous. The receiver must be ready to receive serve when the server is ready to serve.
14. When changing ends, a maximum of 1 minute, 30 seconds may elapse from the time the ball went out of play to end the previous game to the time the first serve begins the next game.
15. The ball is in play from the time it is struck by the server until a point has been decided. A ball that lands on any line is good and is considered to be within the court area marked by the line.
16. The receiver must hit a properly served ball on the first bounce and return it across the net into the section between the baseline and either the singles or doubles sidelines, depending on the game (see doubles rules below for more information).
17. After the serve has been returned, it can then be hit by either a volley or groundstroke into the opponent's court as stated above. A return is good if
    a. The ball touches and then goes over the net and lands in the court.
    b. The ball rebounds back over the net (the receiver may reach over but not touch the net to hit the ball).
    c. The ball is hit from outside the posts, or the player's racket extends over the net after the ball was struck..
18. A rally is a series of strokes between the players until a point is scored. A side wins a point when an opponent commits one of the following violations after receiving the ball:
    a. Hits it into the net.
    b. Lets it bounce twice before hitting.
    c. Hits it outside the court.
    d. Hits it before it crosses the net.
    e. Hits it twice or carries it on the racket.
    f. Throws the racket and hits the ball.
    g. Touches the net.
19. A side loses a point for any of the above actions and, on serve, for a double fault.
20. Game point decides the result of a game; set point determines the winner of a set; match point is the point on which the result of the match depends.

The following rules apply to doubles matches:

1. Doubles use the widest portion of the court (36 feet).
2. For serving, the same size service courts are used as in singles.
3. Teams alternate serves after each game, as in singles play: Team A serves the first game, Team B the second, and so on.
4. Each team's players alternate serving complete

games. Player 1 on Team A serves game 1; Player 2 on Team A serves game 3, and so on. *Players also alternate receiving serves.*

5. If a player is discovered to have served out of turn, his/her partner will serve the next point, but all prior points count. If a game is completed before the error is discovered, the play stands as is and the order of service remains as altered.
6. If a team is discovered to have changed its receiving order, this order will remain until the end of the game, at which time the team will resume its normal receiving order.
7. Doubles partners do not have to alternate hits.
8. If both partners hit a ball, either simultaneously or consecutively, it is an illegal hit. However, if one partner's racket touches the other partner's racket but does not hit the ball, this is legal.

Scoring

The server scores a point if he/she hits an ace (a serve that the receiver cannot return), or if the serve hits the opponent. The receiver scores a point if the opposing player does any of the following:

1. Cannot return a ball before it bounces twice on his/her side.
2. Returns the ball out of bounds.
3. Hits the ball into the net.
4. Carries or catches the ball on the racket or deliberately touches the ball with the racket more than once.
5. Touches the net.
6. Hits the ball by throwing the racket.
7. Hits the ball before it has crossed the net.

Each game begins at 0-0, or love. The first point scored is 15, the second is 30, the third is 40, and the fourth is game point. Game point wins the game unless the score is a deuce (40-40). If the server scores in deuce, the server gains the advantage, or ad. If he/she scores the next point, he/she wins. If the opponent scores the next point, it is again deuce. A player must win by two points. When the server has the advantage, it is called ad-in, and when the receiver has the advantage, it is called ad-out.

The first player or side to win six games and lead by two games wins the set. A match is composed of the best two-of-three sets or the best three-of-five. If a set is 6-6, a tie breaker is often used to determine the winner. Players play 12 points, and the first player to reach at least 7 points, who is ahead by 2 points, wins the tiebreaker and the set. If the score is 6-6 after 12 points, the players change ends and resume play until one is ahead by 2 points. In a tie breaker, the player whose turn it is to serve serves first. The opponent serves the next two serves. It continues with each player serving twice until the set has been decided. Players change ends every 6 points. The points that decide the result of a game, set, or match are called game point, set point, and match point, respectively. The server's score is always given first.

Tactics

Singles Strategy

The Serve

1. Stand near the center of the baseline to serve.
2. Do not waste energy and time trying to serve aces.
3. Place serves to your opponent's weakest sides or to an open area in the service court.
4. Serve directly at players who take big backswings on their groundstrokes.
5. Do not follow your serve to the net unless it is very good and you can volley well.
6. Use more spin and less space on second serves.
7. Use a variety of serves during a match.

Returning Serves

1. Stand on or behind the baseline one to two steps from where the baseline and singles sideline meet.
2. Move in a step or two on second serves.
3. Learn to anticipate your opponent's second serves.
4. Return fast serves with a short backswing.
5. Return the ball deep to the corners when possible.

Groundstrokes

1. Stand on or just behind the center of the baseline between groundstrokes. As soon as you hit one shot, move back to that position unless you are in the forecourt.
2. Hit groundstrokes cross-court, deeply to the backcourt, and high over the net. That will make

your opponent run to hit shots and stay in the backcourt. It will also give you more distance with which to work.

3. Hit to open spots on the court when you can.
4. Do not try to put shots away from a position behind your baseline.
5. Keep the ball low and wide on passing shots against a net player.
6. Use your best stroke on all setups, even if you have to run around the ball to hit it.

Approach Shots

1. Use approach shots on balls that bounce near or inside the service court.
2. Take a shorter backswing.
3. Use a backspin.
4. Hit approaches down the line to which you are closest.
5. Do not try to win the point with an approach shot. Use it to set your opponent up and win with a volley.

Volleys

1. Play volleys from a position about 10 feet from the net near the center of the court.
2. Move closer to the net following a good volley.
3. Volley to the open part of the court.
4. When you volley a low shot, volley it deep and down the middle of the court.
5. When you volley a high shot, volley at an angle and go for a winner.
6. Cover the open court on your side after you hit a volley.
7. Get set to hit volleys. Do not hit on the run unless you have to.

Lobs

1. When you run wide to retrieve a deep shot, lob cross-court.
2. Make defensive lobs go deep and high into your opponent's court.
3. Use lobs more often when the other player has to look into the sun.
4. Follow offensive lobs to the net.

Smashes

1. Change the direction of two smashes in a row.
2. Try to put smashes away when you are close to the net.
3. Hit smashes flat when you are near the net. Use some spin when smashing farther from the net.

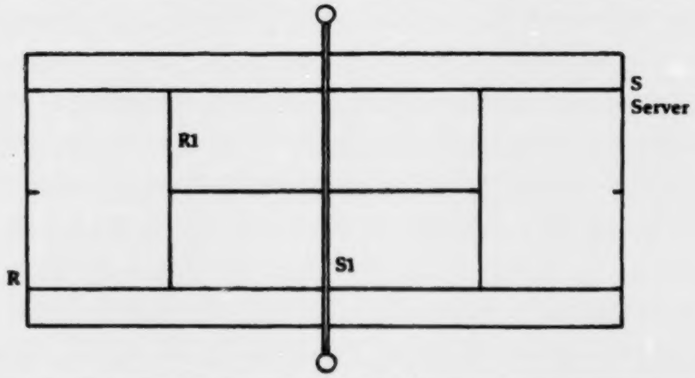
Drop Shots

1. Do not use drop shots from the baseline, when the wind is at your back, or against players who can run fast.
2. Use drop shots when your opponent expects you to hit a deep shot.

Doubles Strategy

1. Stand halfway between the center mark and the doubles sideline to serve (Diagram 2).
2. Serve to the backhand or to the open part of the service court.
3. Let the strongest server begin serving each set.
4. Receive the serve at a point where the baseline meets the singles sideline (Diagram 2).
5. If the server stays back after the serve, return the ball deep and cross-court.
6. If the server comes to the net following a serve, return the ball short and cross-court.
7. If the server's partner plays too close to the net, try lobbing.
8. When your partner is receiving the serve, stand even with him/her on the baseline or move up to the middle of the service line on your side of the court (Diagram 2).
9. When your partner is serving, stand 8-10 feet from the net and two steps inside the singles sideline toward the center of the court (Diagram 2).
10. If your partner has to move off to the side of the court to retrieve a shot, shift in that direction to cover the open court.
11. When your partner is serving, protect your side of the court by taking weak shots down the middle and smash any lobs hit to your side.
12. When you are playing the net and a lob goes over your head, cross to the other side and fall back to cover the open court while your partner retrieves the lob.
13. When volleying, hit to the open part of the court or at the closest opponent if you are in an offensive position.

Diagram 2. Positions for Starting Point in Doubles



14. Volley to the opponent farther away from you when hitting a defensive volley.
15. When both opponents are at the net and you are on the baseline, hit most shots low and down the middle.
16. Hit smashes down the middle of the court.
17. Play with a partner you like and can get along with on and off the court.
18. Talk to your partner during the match.
19. Let the player with the strongest backhand play the left side of the court when receiving serves.

General Strategy

1. Change tactics if you are losing.
2. Hit toward a general target area instead of going for lines and corners.
3. Play the ball instead of your opponent, especially in pressure situations.
4. Do not try risky shots on points you cannot afford to lose.
5. Concentrate on winning the first point of every game and the first game of every set.
6. Try to be consistent rather than powerful. Most points are lost with poor shots, not won by great ones.
7. Start getting ready for the next shot as soon as you have hit the last one.
8. Find out what your opponent's weakest shot is and take advantage of that weakness.

Resources for Continued Participation

Books

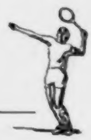
1. Brown, J. (1989). *Steps to success: Tennis.* Leisure Press: Champaign, IL.
2. Bryant, J. E. (1997). *Game, set, match: A tennis guide.* Englewood, CO: Morton Publishing Company.

Internet Sites

1. http://www.tennisone.com
2. http://www.tennisserver.com
3. http://www.tennisonline.com
4. http://www.tennis.com
5. http://www.uspta.org
6. http://www.usatennis.com
7. http://www.tennisw.com/
8. http://www.tennisfame.com/
9. http://www.usta.com/index.html

Wheelchair Tennis sites

10. http://www.altafoundation.org/wheelchair_tennis.html
11. http://info.lut.ac.uk/research/paad/ipc/tennis/tennis.html
12. http://www.crowncity.com/jwct/jwct4.htm
13. http://drc.arizona.edu/wctennis.html
14. http://www.usta.com/usatennis/wheelchair/index.html



Organizations

United States Tennis Association, Inc.
70 West Red Oak Lane
White Planes, NY 10604-3602
(914) 696-7000

American Tennis Association
P.O. Box 3277
Silver Spring, MD 20918-9998

United States Recreational Tennis Association
3112 Adderley Ct.
Silver Spring, MD 20906

References

Broido, B. (1993). *Spalding book of rules.* Indianapolis, IN: Masters Press.

Brown, J. (1989). *Steps to success: Tennis.* Champaign, IL: Leisure Press.

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Hynes-Dusel, J. M. (2002). *Tennis.* In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education.* Reston, VA: National Association for Sport and Physical Education.

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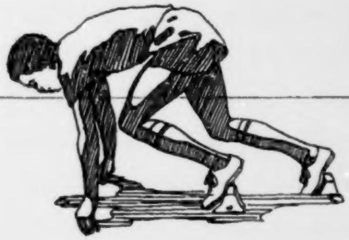
Tunis, J. R. (1940). *Sport for the fun of it.* New York, NY: A.S. Barnes and Company.

CHAPTER 22

Track and Field



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Introduction

Track and field is one of our oldest sports, with competitive roots dating back to ancient Greece and the first Olympic Games. Today the sport enjoys widespread international competition and is a celebrated cornerstone event of the modern Olympic Games. Consistent with the Olympic motto, "Citius, Altius, Fortius," which means "swifter, higher, faster," participation and training in the sport of track and field provides opportunity for performers of all sizes, shapes, and abilities to engage in activities designed to improve individual speed, jumping, throwing, or endurance capabilities.

Terminology

Acceleration. How fast the speed of an object or body can be changed. The rate of acceleration is proportional to the force applied and inversely proportional to the mass of the object ($A=F/M$). For example, a larger applied force would cause a greater change in acceleration than a smaller force. Alternatively, moving a more massive object requires a greater force than is needed to move a less massive object.

Braking Forces. Forces that slow down a body's speed.

Force. A push or pull that tends to cause motion or change in motion to an object or body.

Power. The rate at which muscular force is applied to move an object. Power = force x velocity. A more powerful person can move a heavy weight faster than a less powerful person.

Reaction Time. How quickly the human body can respond to a stimulus, i.e., the sound of a starting gun.

Stride Length. The distance covered by a running stride. Distance run/# of strides taken. One stride is a right-foot takeoff to a right-foot landing or a left-foot takeoff to a left-foot landing. For example, if a runner covers 40 meters in 10 strides, then each stride is 4 meters long.

Stride Rate. The speed of a running stride. Time of the distance run/# of strides taken to cover that distance. For example, if it takes a runner 6 seconds to run 10 strides , then the stride rate is 6 seconds/10 strides, which equals .6 seconds/stride. Consider a runner who sprints a 40 meter distance in 6 seconds while taking 10 strides to complete the distance. The stride rate for the 40 meters is 6 seconds/10 strides, which equals .6 seconds/stride.

Basic Skills

The events composing a track and field meet vary from state to state but most U.S. schools contest at least 14 core events (Table 1). To introduce the basic skills of track and field, this chapter will focus on skills that represent the major categories of a track meet—sprinting, distance running, hurdling, relay running, shot put, and long jump.

Sprinting

Sprint events are short races that measure how fast a competitor can accelerate to maximum running speed and then sustain that speed for the duration of the race (Table 2). Effectiveness is determined by a sprinter's ability to generate power to accelerate, have quick reaction and muscle response time, and generate and maintain the longest stride that can be completed quickly. This last variable is called the stride length–stride rate tradeoff and is a critical component of good sprint technique.

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Table 1. High school track and field event categories, subcategories, and specific events.

Event Categories	Subcategories	Events (*not core events for both boys and girls)
Running	Short sprinting	100m, 200m, 4 x 100m relay, 4 x 200m relay*
	Long sprinting	400m, 4 x 400m relay
	Hurdling	100m hurdles (girls), 110m high hurdles (boys) Intermediate hurdles (300m, 8-hurdle) or Long hurdles (400m, 10-hurdle)
	Middle distance	800m run, 4 x 800m relay*
	Distance	1600m or mile, 3200m
Jumping	Horizontal jumps	Long jump, triple jump*
	Vertical jumps	High jump, pole vault*
Throwing	From ring	Shot put, discus, hammer*
	From approach	Javelin*

Table 2. Sprint events, distance on 400m track, and rules.

Event	Distance on 400m track	Rules
100m	Straight (1/4 of 400mtrack)	3-command start, lanes all the way
200m	Curve + straight (1/2 of track)	3-command start, 1-turn stagger, lanes all the way
400m	1 full lap	3-command start, 2-turn stagger, lanes all the way

Basic Sprint Form

Basic sprint form can be broken down into three functional phases: the push-off, the airborne or stride phase, and the landing phase (Table 3).

Sprint Drill Progression

Sprint training involves learning and practicing the process of generating great forces at push-off and then minimizing those same forces at landing. Due to the sprinter's speed, forces exceeding 3-4 or more times body weight will be experienced at landing. The sprinter has to be able to effectively absorb this force at the feet, ankles, knees, and hips and then convert that absorbed force into the next push-off without sustaining injury. To prevent injury, it is important to select a progression of drills that allow the legs to adapt to the new stresses being placed on them. To do this, initial drill selection should be of the less ballistic variety (i.e., high knees, butt kicks, lunge steps, or sprinting against resistance are less ballistic than bounding, single-leg hopping, or skipping). Other ways to minimize initial leg stress are to limit total repeats of any drill and gradually increase total repeats over time; wear good, protective shoes designed for running; try to do drills and repeats on softer surfaces such as grass, sand, or mats; or alternate ballistic days with nonballistic days.

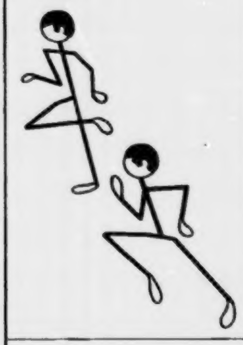
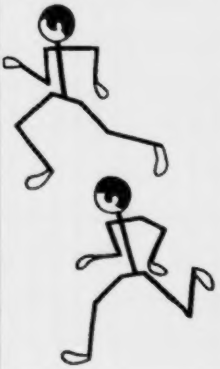
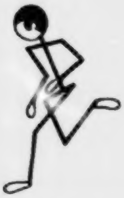
Sprint Warm-up

Initial sprint work should be preceded by a progressive and specific warm-up involving the movements that will be used later in the lesson or workout. The warm-up should progress from larger, slower motions to more specific and quicker motions. Both dynamic and static flexibility should be part of the warm-up. Static flexibility is slow, isolated stretch and hold flexibility. Dynamic flexibility for sprinting includes movements that gradually increase flexibility specific to the sprint motion. For example, a warm-up might start with jogging and then progress to light drills like high knees, easy skipping, and slow lunge steps. Each of these drills will increase your flexibility but should be done in a dynamic way similar to how the muscles will be needed in the lesson or workout. The warm-up should conclude with motions similar in nature and speed to what you will do in practice that day. For example, if you will be sprinting short, fast form repeats, the warm-up should end with accelerations that near the speed demanded of the repeats.

Sprint Starts

Accelerating quickly to maximum speed is an important component of all sprint races. Sprinter speed of acceleration is determined by reaction time and how

Table 3: Skill checklist, cues, drills for push-off phase of sprinting.

Push-off	**Skill Checklist**	**Cues**	**Drills**
Side view 	Push-off leg - Straight line – ball of foot to hip Drive leg - Top of thigh almost parallel to ground Trunk - Tall – (slightly in front of hips) - Still – no rotation Drive arm - Elbow 90°, chin height Nondrive arm - Behind trunk, elbow near 90° - Upper arm near parallel to ground	- Push hips forward - Peel back track - Quick knee drive - Drive forward - Run tall - Keep trunk still - Shoulders do work - Hands and arms relaxed - Strong, smooth pendulum motion from shoulders	- Sprint against resistance - Skipping for distance - High knees - Bounding - Skipping for height - High knees, skipping, bounding, working on smooth, fluid arm motion
Front View	Drive leg - Forward from hip Drive arm - Forward from shoulder	- Drive & arm forward	
Stride	**Skill Checklist**	**Cues**	**Drills**
Side View 	Leg that just pushed off - Heel tucking to buttocks Forward leg and foot - Start clawing motion prior to landing Trunk - Tall (shoulders above or slightly in front of hips) and no rotation - Little to no up and down movement	- Tuck the heel - Peel the track back	- Butt kicks - Single-leg hops for distance - Straight leg bounding - Standing claw drill
Landing	**Skill Checklist**	**Cues**	**Drills**
Side View 	Landing foot and leg - Slightly in front of body - Hip and knee slightly flexed Drive leg - Heel tucked to buttocks - Thigh of drive leg swinging forward Drive arm - Swinging forward	- Stay up on the balls of feet - Quick turnover like track is hot	- Quick feet drills (i.e., high knees, skipping for distance, straight leg bounding) like the track is hot

fast the body weight can be moved. It is also determined by the starting position prior to acceleration. There are several starting positions that can be used to get the sprinter into a better position to accelerate. The important components of any starting position is that it allows the starter to do the following:

1. Quickly become unbalanced.
2. Quickly drive the arm and leg forward in front of the body.
3. Push off in a more horizontal or forward (rather than upward) direction.

Standing start

For students just learning to accelerate, a standing start teaches the principles of push-off and body position. For a standing start, the runner stands in a position with one foot in front of the other and with the front foot behind the starting line. When the race has a three-command start, the runner holds still on the first command (ON YOUR MARKS). When the starter signals SET, the runners bend their knees in preparation for the following push-off and lean forward over the line. Arms move to a ready position opposite the legs to allow the first arm motion to be powerful. For example, if the right foot is forward, on the SET command the left arm is brought forward and the right arm back. The left arm is now in position to drive back at the gun while the right arm will drive forward, synchronized with the left leg. When the gun sounds, push forward off the front leg while driving the back leg and opposite arm forward. The first few steps are shorter, quicker steps. As you accelerate to maximum speed and optimal stride length and stride rate, these steps get longer.

Block Starts

Once sprinters have accomplished effective standing starts and have gained strength and understanding of body position during acceleration, they often feel the need to get a better push from their first step. To create a better first push, starting blocks are used. There are several kinds of starting blocks, but the most popular is a type that has two moveable foot pedals set up at an angle to the track. The foot pedals allow the sprinter to push back into the block without slipping. The blocks themselves are designed to stay in place on the track and not move back when the sprinter pushes against them. Sprinters set the blocks at a distance from the starting line that is appropriate for their height and leg length. Three commands are used for races where sprinters use blocks (Table 4).

Hurdling

Hurdle events are sprint races with evenly spaced hurdles (or barriers) placed in the lanes. In most track meets, both a long sprint (300 or 400m) and a short sprint (100 or 110m) race are offered (Table 5). Because the barriers are evenly spaced, hurdling is a rhythmic event. Throughout the race, the hurdler tries to maintain a stride length and rate that brings them to about the same takeoff point before each hurdle. The exact rhythm used by hurdlers depends on their height and speed. In the short sprint event, for example, a shorter or novice hurdler may take five steps between hurdles whereas a taller or more experienced hurdler may take three steps. An odd number of steps between hurdles allows for hurdle clearance with the same lead leg (first leg over the hurdle), whereas an even number of steps forces the hurdler to alternate the lead leg. Good hurdlers take fewer but fast consistent strides.

Using a sprint block start to begin the race, hurdlers attempt to clear all the hurdles in their lane and complete the race as quickly as they can. A hurdler's goal is to accelerate quickly up to maximum speed before the first hurdle (13m from the start for girls and 13.72 m for boys). The goal for each hurdle is to clear it with the least deviation from good sprint form. The actual hurdle form used will depend somewhat on how tall the hurdler is relative to the hurdle height. A taller hurdler can clear a hurdle with less sprint form deviation, whereas a shorter hurdler must "jump" or "leap" more at each hurdle to ensure clearance. Similarly, boys' 110m hurdles, which are 9" taller than girls' 100m hurdles, require a more exaggerated sprint form change.

Hurdle form can be broken down into three phases: takeoff, clearance, and landing. The takeoff is an exaggerated sprint step taken on the front side of the hurdle. The takeoff angle and speed are both important and will determine the clearance trajectory (the path the body takes over the hurdle). The clearance is the time the hurdler spends over the hurdle. Because no new speed can be added while the hurdler is in the air, the goal is to spend as little time in the air as possible. The best trajectory for a hurdler is the lowest angle that can be achieved without hitting the hurdle. During the takeoff, clearance, and landing, the hurdler maintains good sprint form with some exceptions:

1. At the end of the forward knee drive at takeoff, the lower leg and foot is allowed to "whip" ahead of the knee so the heel of the foot will clear the hurdle first. This is an exaggeration of the motion that already occurs while sprinting and leads to a longer, bounding stride to allow hurdle clearance.
2. Because of the additional lower leg movement (forward and upward), the upper body must compensate by moving the drive arm farther forward and leaning the trunk forward. The amount of lean and arm movement is dependent on how high the hurdle is relative to the hurdler. Shorter hurdlers and hurdlers racing in higher hurdle events tend to have more forward movement.
3. The trail leg (second leg over the hurdle) also has to deviate. During sprinting, the leg recovers

Table 4. Skill checklist, cues, and drills for block starts.

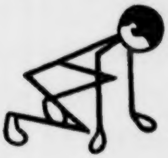
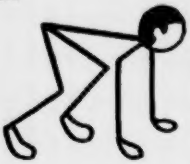
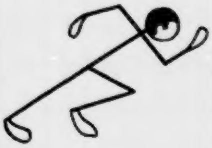
Commands	Skill Checklist	Cues	Drills
On your marks 	Power or push-off leg - Front block, weight on ball of foot Back leg - Back block, weight on ball of foot - Knee rests on the ground Hands and arms - Shoulder width apart, arms straight, weight on fingers-thumb bridge - Shoulders directly over hands Trunk and Head - Mostly flat	- Back into blocks, power leg first - Not cramped or tight - Feel balanced - Feel weight evenly on hands under shoulders - Eyes on ground just in front of sprinter	- Determine block and pedal position. - Get into blocks several times from a standing position and check position
Set 	Hips -Power leg knee and hip at 90° -Back leg knee at 135° Shoulders -Slightly in front of hands Hips, trunk, head - In line	- Hips go straight up - Not too fast, evenly - More weight on hands - Focus on commands - Eyes on ground just in front of sprinter	- Repeat SET with feedback - Hold set in repeats of 3, 5, 7 seconds - Repeats with different command cadences
Go (Gun) 	Power (front) leg -Straight line toe to shoulder Back leg - Drives forward - Foot tucked under the knee Arms - Drive arm powers forward farther than normal, hand may be in front of forehead - Back arm also exaggerated Trunk - Straight line toe to head	- Push and drive in one motion - Push through hips - Quick push like the ground is hot - Drive both arms in one motion	- Come out of block against resistance (partner pushing back—not down—against you) for one to several steps
Next steps	Stride length - Each step gradually lengthens Feet position - Toes stay mostly forward Trunk position - More upright each step - Max. speed achieved at 10-20m	- Quick accelerating rhythm - Quick, short steps - Push through hips	-Mark steps out of blocks, adjust for constant increase, then practice with new marks. -Repeat timed starts for 10, 15, 20m.

Table 5: Hurdle events, distances on 400m track, and rules

Hurdles	Distance on 400m track	Rules
100m (girls) 110m high (boys),	1 straightaway, 10 hurdles Girls-30", boys-39" hurdles	3-command start, lanes all the way
300m hurdles	3/4 of track, all but first curve, 8 hurdles	Same but 1-turn stagger
400m hurdle 10 hurdle	1 full lap, 10 hurdles, Girls-30", boys-36" hurdles	Same but 2-turn stagger

from the push-off by swinging forward under the hip. If this occurred while hurdling, the hurdler's leg would crash into the hurdle. To clear the trail leg, hurdlers pull it through in a lateral motion so that it travels more parallel to the ground. Other than the direction it is pulled through, the same concepts that apply to sprinter stride form apply to hurdling.

4. On landing, hurdlers face the same problem as sprinters. They must minimize any braking forces at landing and get into position to push off for their next step. This problem is accentuated for hurdlers because they will often have greater up and down movement and less forward momentum due to the longer time spent in the air for hurdle clearance. Yet the same concepts discussed earlier to minimize the braking forces of landing sprinting and moving quickly to the next step apply to hurdlers.

Jumping

There are four different jumps contested in the sport of track and field (Table 6). Two of the jumps, the long jump and the triple jump, use a horizontal acceleration to allow the jumpers to gain speed prior to jumping as far as they can into a sand pit. In the long jump, after accelerating, jumpers try to convert as much of their speed as possible upward without losing too much forward speed. Their goal is to cover as much horizontal distance in the air as possible. Conversely, after acceleration, the triple jumper takes off for one of three consecutive dynamic hops. The triple jumper's goal is to cover maximal horizontal distance on each successive hop while maintaining as much original speed as possible.

The high jump and the pole vault are both vertical jumps. The pole-vaulter uses a straight approach like those used for the horizontal jumps. At the end of the acceleration the vaulter plants a long pole and jumps forward and up into the pole, attempting to use the speed to bend the pole and vault into the air over the bar. The high jumper, on the other hand, uses a curved approach to gain speed and get into position to jump. At takeoff, high jumpers attempt to convert almost all of their running speed into vertical speed.

Regardless of the end goal and methods of attaining that goal, all jumps share some the following common characteristics:

1. Approach to achieve maximum speed.
2. Takeoff to convert horizontal speed into some combination of horizontal and vertical speed.
3. In-air motion to get the body in position to maximize distance.
4. Safe landing.

These characteristics can be further understood by looking more closely at the long jump.

There are several types of airtime technique jumpers might use to counter the forward rotation created at takeoff and to get their feet in front of them for landing. The hang method is effective and easier to learn than the more complicated hitch-kick and will be discussed here (Table 7).

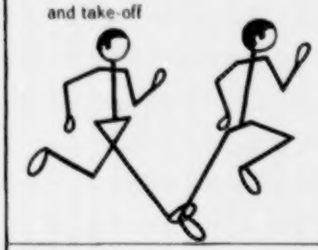
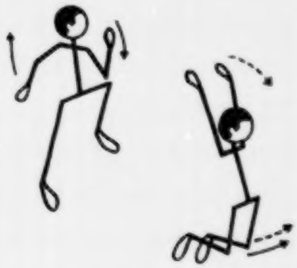
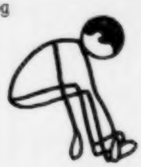
Progression of Drill Development

Because safety is an issue, it is often best when first learning the long jump to start with the landing before progressing to takeoff drills or the approach. During the landing, the body needs to land in a way that it will push sand aside to absorb some of the landing forces. If you land with more vertical force than horizontal force, the sand will give less than if you had landed more horizontally and pushed the sand out of the way.

Table 6: Jumping events, measuring, and rules.

Event	Rules	Measured
Long jump	-Must take off from behind far edge of take-off board -Must leave pit in control of body weight	Farthest edge of take-off board to nearest mark in pit
Triple jump	-Same as long jump but after take-off, jump onto same leg, then onto the opposite leg before landing in pit. Can initially take off with either leg as long as the rhythm is right, right, left or left, left, right before the pit landing	Same as long jump
High jump	-Must take off of one foot -Must clear bar without knocking it off the standards	Height of bar cleared
Pole vault	-Must clear bar without knocking it off the standards	Same as high jump

Table 7: Skill checklist and cues for hang-style long jump.

Long Jump - Hang	Skill Checklist	Cues
Approach	-Reach maximum velocity by last 2 steps -Consistency on board	-Gradual acceleration -Each step adds speed
Preparation step and take-off 	-Longer 2nd to last step- shorter last step Take-off - leg -In front of body, heel to flat foot land -Leg mostly straight Take-off -drive leg -Up and forward -Thigh parallel to ground, foot under knee Drive arm - Drive up and forward	-Long-short -BAAA-boom -Roll up foot, heel-toe -Quick and big knee and arm drive -Up and forward
Hang 	Hips - Pressed forward past knee Arms -Arms above and behind head Hang prep for landing Legs -Knees pulled forward toward chest -Feet "untuck" at end of leg pull Arms -Pull arms forward first, then down past hips	-Press hips -Big arms -Reach back -Never still in the air; either you are pressing or you are pulling -Big knee and arm pull
Landing 	-Heels into sand first -Legs give at landing (bend at knee and hip) -Arms driven past hips - forces trunk forward	-Active arms

Jumpers will land vertically if they do not take off with enough horizontal speed or if they rotate too much in the air so that their feet land directly under them.

Landing Drills

1. Standing jumps from the edge of the pit to attempt to get to the backwards "C" position quickly and pull out of it to get a heel and butt landing.
2. Standing jumps from edge of the pit from a foot-high box. This is the same as the above but will give the jumper more airtime to get into landing position.
3. Dives – standing jumps with more forward push. This drill forces a more active pull through of the knees and arms
4. Dives from a box – same as above but give the jumper a little more airtime to get full motion.

Takeoff Drills

1. Jump rhythm drills – These are 3-step pop-up drills that emphasize the long-short, heel-toe nature of the last two steps and a vertical takeoff. These can be done up and down straightaways on the track or on a softer surface (mats or grass). Once these are practiced and refined, the motion should be extended by adding speed—a 5-step approach. Refinement for both the 3- and 5-step pop-up drill includes adding a quick drive leg and arm action that is used in the takeoff.
2. Box drills – 3- or 5-step pop-ups can then be completed off a box or a ramp. A 6-12" high, large-area box or ramp forces the jumper to leave the ground with a heel-toe rolling foot action. In addition, the box will give the jumper added airtime to refine the takeoff and landing

motions. An added benefit of using the box at a majority of practices is that it tends to be less stressful on the jumpers' legs.

Approach

1. Determine length – It is perhaps easiest to first determine the approach by accelerating from a mark on the track to a distance that is 12, 14, and 16 accelerating sprint steps away. From each of these marks, you then accelerate several times to the designated takeoff board to see which approach feels fast and jumpable.
2. Approach speed – The approach should allow you to accelerate to your maximum sprint speed by the last two steps. To determine which approach creates the greatest maximum speed, set up a cone 5 meters from the takeoff board. Have someone time the last 5 meters of the approach on several full speed pop-up or jump attempts. The fastest 5-meter time will indicate the approach distance and acceleration pattern that yields the fastest final speed.
3. Approach accuracy – Also important is the consistency of the approach, allowing you to repeatedly complete the takeoff as close to the end of the board as you can without going beyond it (foul jump). As a result, once the approach distance is determined, you should spend some time each practice doing approaches for speed and accuracy on the board.

Jumper Warm-Up

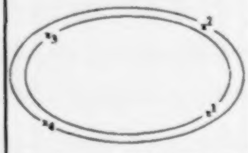
Jumping is a ballistic event. Jumpers try to attain maximum velocity and then, using their body as the shock absorber, try to convert running speed into jumping speed. Therefore, it is not uncommon for jumpers' leg joints, shins, or feet to get sore or become injured. To prevent injury, a good sprint warm-up should precede all jumping sessions. The warm-up should be followed by jump drills that practice good form on takeoff and landing. Conducting jump practices off of a box or on softer surfaces will also support learning while minimizing injury or soreness.

Relays

The first and last running events at track meets are usually relay races (Table 8). Relays are team events composed of four runners. The goal of the relay team is to transport a baton over the race distance as quickly as possible. Each relay runner is responsible for one leg of the relay. The technique of relay running is based on good sprint form and smooth baton exchanges. The exchanges need to be taught and practiced repeatedly to ensure success.

The first relay race traditionally run at a track meet is the 400m relay. The 400m relay exchanges are usually alternate-hand, blind exchanges. An alternate-hand exchange means that the incoming runner gives the baton to the opposite hand of the outgoing runner. The shortest distance around the track is a R-L-R-L pattern. The first runner carries the baton in the right hand and runs on the inside of the lane through the turn. The second runner starts on the outside of the lane to allow room for the incoming runner to pass to the second runner's left hand. The second runner carries the baton to the third runner, passing to the third runner's right hand. The third runner, who started on the inside of the lane, maintains the inside position around the turn and hands off to the final runner's left hand. The final runner starts on the outside of the lane

Table 8: Relay events, race distances, and rules.

Relay Event	Distance on 400m outdoor track	Rules
400m relay or 4x100m 	- 4 runners carry baton over 400m distance - 1 lap -Each runner carries baton 100m - 1/4 of track -Baton exchange must occur within 20m exchange zone.	-3-command start for first runner -2-turn stagger, all runners must stay in their team's lane for the duration of the race.
1600m relay or 4 X 400m	-4 runners carry baton over 1600m distance - 4 laps -Each runner carries baton 400m -1 lap -Baton exchange must occur within 20m exchange zone (10m either side of finish line)	-3-command start for first runner -2-turn stagger, lanes all the way -2nd runner breaks to inside -Subsequent runners arranged by placing order of teammate off homestretch curve

to allow room for the exchange and then carries the baton to the finish.

The exchange is blind because the outgoing runner does not watch the incoming runner. Instead, the outgoing runner places a check mark on the track. The outgoing runner starts accelerating when the incoming runner reaches the check mark. The distance of the check mark is determined by having the two runners for each exchange practice their handoff at full speed repeatedly during practice and adjusting the mark until it is consistent. The outgoing runner is responsible for setting the check mark for the incoming runner. At either a designated number of steps or at a verbal command, the outgoing runner will reach back with the palm up and open to receive the baton. The incoming runner's responsibility is to get the baton in the outgoing runner's hand. The outgoing runner's responsibility is to create a good target with his or her hand for the incoming runner, making it easier for the incoming runner to pass the baton.

The 1600m relay is traditionally the last relay of a track meet. Because the individual relay legs are longer and the race does not occur in lanes after the first leg, a visual exchange is used. With this exchange, the outgoing runner judges the speed of the incoming runner. When the runner is close, the outgoing runner takes a few steps to accelerate and then turns and reaches back to receive the baton. This exchange is usually alternate-handed, right to left, but once the outgoing runner is running, the baton is switched to the right hand.

Middle Distance and Distance

Middle distance and distance form is basically a shorter-strided and less powerful version of sprint form and is similar across events. An effective runner is one who, through training, is physiologically capable of providing energy to the working muscles for the duration of the event and who expends minimal energy creating each step. The most efficient runners will have minimal knee drive and arm swing on each stride while sustaining a consistent speed. To an observer, the distance runner has less knee lift and less forceful push-offs. Their arms are held lower and the arm swing is shorter and may swing slightly across the front of the body. The stride itself should look smooth and effortless even through the runner may be working very hard (Table 9).

Table 9. Middle distance and distance events, race distances, and rules.

Events	Distance on 400m track	Rules
800m	2 full laps	-2-command standing start (RUNNERS SET - GUN) -1-turn stagger, break to inside after first turn
1600m	4 full laps	-Same as above, but break to inside from line
3200m	8 full laps	-Same as above

Table 10: Shot put and discus rules and records.

Shot Put	Rules
Shot put circle – 7-foot-diameter ring -Raised toe board affixed at the front. A legal throw -Must land in legal throwing area -Throwing area designated by 2 lines that extend from the center of the circle out into the throwing area at a 45° angle to each other -The throwing area looks like a slice of a pie. The tip of the pie would touch the center of the circle. The crust of the pie would extend farther into the throwing area than the farthest throw.	-During the throw, the thrower can't touch any part of the top of the toe board, or step over the ring or toe board -Throwers must leave the ring by way of the back half -Throwers must be in control of their body weight as they leave the ring
Discus	**Rules**
The discus ring – 8-foot-diameter circle. -No toe board -Same pie-shaped area as the shot put but much longer because the discus throws can travel much farther than shot put throws. -Surrounded by a protective cage to prevent errant throws.	-Same as shot put except no toe board

Throwing events

The throwing events in track and field measure a person's ability to accelerate an implement so that it will travel as far as possible. The shot put used in outdoor track is a heavy metal ball (8.8 lbs or 4 kg for high school girls and 12 lbs or 5.44 kg for high school boys). Due to its weight, it is thrown much differently than with a traditional whiplike throwing motion (such as a ball might be thrown in softball). Instead, although a successful throw relies on similar throwing principles, it is thrown with a pushing motion. Alternatively, the discus, a somewhat heavy and flat, flying saucer-shaped implement (2.2 lbs or 1 kg for high school girls and 3.56 lbs or 1.6 kg for boys) uses a sidearm whip-like motion to throw it as far as possible (Table 10).

Both the shot put and discus are thrown from a circle and use an acceleration step to create speed from which to throw the implement. In the discus, the acceleration step starts with the thrower facing the back of the circle. During the step, the thrower completes a full turn in the air to again land facing the back of the ring in ready throwing position (power position). The throw is completed by continuing hip and shoulder forward rotation toward the front of the ring and by whipping the throwing arm forward for the discus release. For the shot put, a rotational motion and a gliding motion have both been successfully used to accelerate the thrower to the center of the ring. The rotational motion in shot put is similar to that of the discus throw. The gliding motion is a straight backward driving step to get the thrower into a similar power throwing position. Both motions have proven to be effective, but due to the complexity and uniqueness of the rotational motion, the gliding motion will be discussed here.

Regardless of what the acceleration step looks like, the ultimate goal is for the thrower to land in good power position at the end of the acceleration phase. Once the thrower is in good power position, the sequence of actions occurring from the feet to the shoulders is similar to those occurring in many throwing and striking events. So the foot, leg, hip, trunk, and shoulder motion of the shot put and discus intended to create push against the ground to develop great forward and rotational forces to be transferred to an implement are similar for a power hitting swing in baseball/softball, a golf drive, or a tennis forehand. The shot put glide motion can be broken down into three movement phases: the glide, the throw, and the follow-through (Table 11).

Shot put

Progression of drill development

The gliding shot put motion is a new movement for most students. In few other sports do we accelerate backwards and throw a heavy object. Because it is such a novel motion, it is often best to start with the simpler and more familiar part of the motion—the throw from power position.

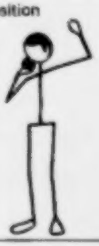
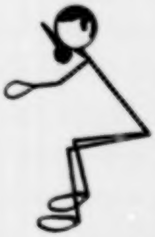
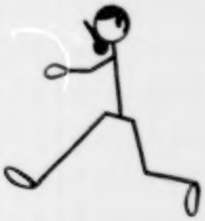
Shot Put Placement

Place the shot in your hand over the base of the fingers. Usually all four or the middle three fingers are behind the shot and are fairly close together. The thumb, placed under the shot, will hold the shot in place on the fingers. With this grip, the shot is pressed into the neck just behind the chin and in front of the ear.

Progression for Punching the Shot in the Power Position

1. Punch the floor – Lean forward slightly and pick a spot on the floor. Rotate your shoulders slightly to raise the shot and then quickly unwind your shoulders while pushing the shot (punching it) toward the floor. Try to punch and rotate faster and faster so the shot really smacks the floor.
2. Punch for height – With your trunk upright, squat down slightly at the knees and hips with a shoulder width stance and punch the shot into the air as you quickly extend your knees and hips. Experiment with lower and lower squats to see how high the shot will go. Make sure the punch is happening with the legs.
3. Punch for distance – Stand with your feet shoulder width apart and in a strided position (power leg in back and block leg in front). Slightly rotate your shoulders back toward your power leg and bend the power leg slightly to shift weight back onto it. Punch the shot as you push forward and up with your power leg and unwind your shoulders. Experiment with lower and lower positions, noting that when you go lower, your knees and feet will need to rotate 90 degrees away from the throw (toward the side).
4. Practice getting into the power position, using a cue sheet and skill checklist (Table 12), and punching the shot from that position. Try to make that position as much like the punch for height and distance positions as you can but with more rotation and push.

Table 11: Shot put starting position, glide preparation, and glide skill checklist and cues.

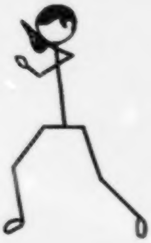
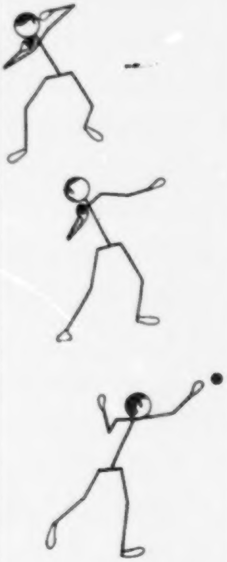
Shot Put	Skill Checklist	Cues
Starting position 	Position - Thrower at back of ring facing back of ring - Standing, one foot in front of the other - Weight on power leg (right for right-hander) - Drive leg (nonpower) used for balance (ball of foot) - Shot put pressed into the neck with base of fingers - Throwing arm mostly parallel to the ground - Nonthrowing arm extended out back of circle	- Find balance
Glide preparation 	The power leg - All weight shifts to power leg, ball of foot - Crouched near 90° hip and knee angle Nonpower or drive leg - Drive leg is lifted off ground, knee bent 90° - Swings toward power leg knee Trunk - Upright like a good squat position Throwing arm - Pressing shot into neck Nonthrowing arm - Extended back out of circle	- Weight on ball - Hips low to ground - Shoulders up - Stay closed - Use for balance
Glide 	Power leg - Flat hop to center of ring Drive leg - Drives toward front of ring Shoulders - Move with hips (not behind) - Little motion (stay closed toward back of ring) Hips - Hips opening toward power position Throwing arm - Press shot to neck Nonthrowing arm - Extended toward back of circle and somewhat across chest	- Drive back and up - Shoulders closed - Get hips turned - Keep shot back - Use arm to stay closed, reach across and back

Adding the Glide

Often when a glide is first added to a thrower's motion, performance declines. As the thrower learns how and when to push from a moving position, performance will again increase.

1. Slide and punch – Returning to the punch for distance drill, the thrower now adds a short sliding motion before the push and punch. A slide is a movement like a basketball slide, where a person steps quickly sideways without the feet crossing. Start standing at the back of the ring with the hips and feet pointing mostly forward. Slide one step toward the front of the ring and land in a somewhat open power position. From there, push forward and punch the shot as the shoulders rotate forward. This drill can be done in progressively more closed positions with the knees and hips rotated 90 degrees away from the release and the shoulders closed toward the back of the circle. Also the drill can be completed from lower and lower hip and knee angles to allow greater and greater push.
2. Hip turn and punch progression – This drill allows the thrower to practice turning the hips, knees,

Table 12: Shot put power position, throw, and follow-through skill checklist and cues.

Shot Put	**Skill Checklist**	**Cues**
Power position 	Power leg - Foot near center of circle, weight on ball - Hip and knee bent in crouched landing over the foot Drive leg (now in position to block) - In front of body near toe board, knee slightly flexed - Knee and foot facing 90° from throw direction - Bears little weight but ready block (push back) - Drive foot (inside ball) lands immediately after power side foot Hips - Land rotated 90° from back of the ring - Land over the power leg Shoulders - Upright over hips and closed Non-throwing arm - Mostly parallel to ground - Extended behind and in opposite direction to the throw to help keep trunk closed	- Hips over power leg - Land long and low - Leg down quick - Don't land on it, get it down to push back - Keep hips closed - Trunk faces back of ring - Control shoulders with arm
Throw 	Power leg - Extends – straight line from ball of foot to hips - Pushes same-side hip forward and up to front of ring Block leg - Straight line – ball of foot to hips, pushing hip backwards and up, resisting complete shift of body weight onto foot Hips - Rotate quickly toward direction of throw - Throw-side hip moves to front of ring - Nonthrow-side hip, due to leg block, lags behind Shoulders and throwing arm - Rotate quickly forward, try to catch up to hips - Shot put punched from neck when shoulder rotation catches up to hips - Punching motion completed at front of ring, with shoulder and arm extending beyond toe board -Punch-side shoulder well in front of other shoulder Nonthrowing arm - Force shoulder rotation by throwing arm back - Travels in opposite direction as throwing arm	- Push forward and up - Toe, knee, hip turning and pushing at same time -Quick hip pop -Unwind -Catch up to legs so you complete punch with leg push -Drive arm back as you start throw
Follow-through (reverse)	Power leg - Usually ends up in front of ring pushing back Nonpower or block leg - Usually ends up toward center of ring Throwing arm - Follow through in direction of throw Nonthrowing arm - Continue motion	

and feet 90 degrees from the glide starting position while keeping the shoulders still and closed. Hip turn: Stand on any straight line on a track so that the feet are parallel to the line. Without moving any distance, hop slightly up and turn the hips while keeping the shoulders and trunk as still as possible and pointed to the back of the ring. The feet should land perpendicular to the line. Hip turn, power position: Repeat the same drill, but land in the power position with your weight on the power leg and the block leg ready to block. Hip turn, power position, with throw: Now add the throw. From here you can then try to cover more distance, land lower, or unwind faster. All the cues and elements of the power position and the throw should guide these movements.

3. The hip turn and punch drill can be modified to a full glide motion by adding the nonthrowing leg drive. This is first practiced without the shot. It is the same motion as the hip turn and punch except the push-off is stronger and is accompanied by a strong leg drive, backwards and slightly upward from the back of the ring. Once you can land in good power position, the drill should be extended to also include the leg and hip action. Then the upper body motion can be added, followed by actual throws.

The Role of Conditioning

The shot put, different from many of the other track events, requires strength and power from both the lower and upper extremities. In addition, because the shot is so heavy and the technique of shot put throwing requires the body to quickly accelerate the body and just as quickly decelerate it, great physical demands are created on almost all the body joints. As a result, conditioning that includes strength and power development as well as core body and joint integrity strengthening are important.

Warm-Up

An appropriate specific warm-up ensures that throwers are prepared for the demands of throwing. In addition, a good warm-up allows the thrower to practice progressively specific form drills to prepare for the lesson or workout that follows. Like all good warm-ups, the throwing warm-up needs to start with a general motion that uses most muscles of the body. Examples might be easy jogging for 400-800 meters or rope jumping. This phase is often followed by light loosening up and static stretching activities. Drills that the thrower has already learned are appropriate to continue the warm-up. These drills, to be effective at providing dynamic flexibility and continued warming up, should start with larger, big-muscle, slower motions (like one of the power position drills or over-the-back two-handed shot put throws) and progress to more complex and faster motions. At the same time, for these drills to also allow good technical practice, they should be accompanied by coaching from a peer or teacher using the skill checklists or cue sheets. The warm-up should progress up to the point where the thrower is ready to learn a new skill or refine a motion.

Track and Field Meets

Track and field is considered an individual sport because a competitor's performance relies only on how well that competitor performs in relation to other competitors in the event. Therefore, a competitor places first in the long jump competition if his/her performance is the farthest fair distance jumped in that competition. Although dependent on individual performance, track and field competition also has a team component. The top places in each event earn team points. For example, a person who finishes first gets more points than a person who finishes second, second place earns more points than third, and so on. The number of scoring places depends on the number of teams competing in a meet. In meets where there are more teams, the rules of scoring allow points for more individual and relay finishers. Team scoring is accomplished by adding together the earned points of all individual and relay competitors who finish in a scoring place. The total team points are then compared to those of the competing teams, and results are ranked. The team with the most points earns the meet title. Good team performance relies on the following:

1. The depth of the team talent and development of more individual team members into potential scorers.
2. The versatility of individuals on a team and development of individuals to score in more than one event.
3. The breadth of the team talent across all events and development of an equal spread of capable individuals across all events.

Safety while Competing or Practicing

Safety on the track and in the field is a final issue for consideration. Different from many sporting activities, practices and competitions in track and field events are often organized with many different events going on at the same time. For example, one group of students may be practicing block starts and sprinting on the straightaway while another group is practicing the long jump takeoff and yet a third group is working on the shot put. Potential for accidents and injuries exists as students move from one venue to another. Further potential for accidents or injuries occurs with improper use of equipment. It is each student's responsibility to be aware of other students practicing or competing in events while ensuring that they use the facility and equipment in the proper way.

General track and field safety rules

1. Look both ways before stepping onto the track, long jump runway, or into the field.
2. It is your responsibility to make sure the area is clear before attempting to jump, run, or throw.
3. Recover off the track, on the infield, or in the outside lanes after running a repeat so you are out of the way of other runners.
4. Only run, jump, or throw in one direction to prevent collision.
5. Put away all equipment after use. This will protect your equipment and eliminate potential hazards (for example, a rake left in or around the long jump pit might trip or more severely hurt a student preparing to jump).
6. Return the facility to its original state of being neat and ready for competition or practice. This includes putting away equipment, raking the long jump pits, and covering or protecting equipment that stays on the field. An unturned or unraked pit, for example, is unsafe for student landing and can often cause ankle, knee, or back injuries.
7. Only use equipment in the way it was designed. For example, do not jump a hurdle in the backward direction. If the hurdle is hit in the backward direction, it will not tip over as it is designed to do when hit from the correct direction. Instead, it will tip up, causing the student to fall, often on top of the hurdle.
8. The track and field area is divided into designated zones specifically designed for each event. Practice the event only in the designated area. It is also your responsibility to know what is happening on the track and to exercise care when entering any area on the track. For example, never enter the shot put area without first checking to see that no one is throwing.

Additional Resources

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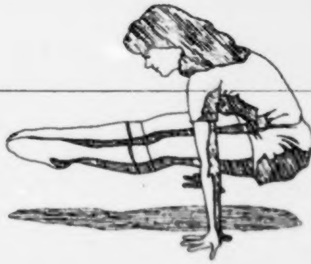
CHAPTER 23

Tumbling



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NASPE wishes to thank USA Gymnastics for granting permission to reprint illustrations from their publication Women's Jr. Olympic Compulsory Program *manual, 2001-2005 edition. Additional information regarding the sport is available at www.usa-gymnastics.org.*

Introduction

Tumbling is the basis for virtually all gymnastics. Tumbling skills not only provide the foundation for all gymnastics events,[1] they also set the groundwork for falling properly. Although tumbling can be designed for students of all skill and experience levels, adequate strength, flexibility, and body awareness are the general but essential prerequisites for both safety and adequate skill progression in tumbling.

Table 1. The Competitive Events for Men's and Women's Artistic Gymnastics

Women's Competitive Events	Men's Competitive Events
1. Vaulting (side horse)	1. Vaulting Side horse for beginners Long horse for intermediate and advanced
2. Uneven Bars	2. Parallel Bars
3. Balance Beam	3. Pommel Horse Mushroom for beginners
4. Floor Exercise	4. Still Rings
5. All Around (4 events)	5. Horizontal Bar
	6. Floor Exercise
	7. All Around (6 events)

A list of tumbling skills could be virtually unending. Basic skills can be varied by using different body positions such as the tuck, pike, straight, stoop, straddle, etc., as well as different starting and ending positions. Elements can be added together to form many different combinations of movement sequences of varying complexity, length, and difficulty. The skills described in this brief chapter are limited to basic, foundation skills, the mastery of which can lead to more advanced skills and combinations.

Basic Terms and Fundamental Skills

Body Positions. A variety of body positions are used in gymnastics. The following common body positions are matched with their commonly used descriptive labels to help you picture accurately the movements described throughout this chapter (see Figure 1).

Balancing Skills. These skills are often simple in concept but difficult to execute properly without sufficient strength and body awareness. Flexibility influences the range of motion (often called amplitude). Static balancing skills are essential prerequisites for more dynamic skills and improve rapidly with practice. Strength, cardiovascular endurance, and flexibility requirements are minimal on beginning attempts, but, as these factors improve, the amplitude with which subsequent attempts can be achieved is increased dramatically. These skills are commonly taught in basic dance classes as well. Figure 2 illustrates basic skills

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[1] In competition, there are six men's events and the four women's events. (See Table 1.) Tumbling is also part of trampoline and rhythmic gymnastics (which uses balls, Indian clubs, hoops, and ribbons intertwined with basic tumbling and dance movements.

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that balance vertically. Figure 3 depicts inverted balancing skills and Figure 4 a variety of other types of balancing skills.

Foot Positions and Leaps. A variety of leaps, closely related to dance movements, are important components of tumbling. These skills are easily initiated but are often difficult to execute correctly. Figure 5 illustrates the five basic foot positions used in gymnastics and dance. Figure 6 shows the sequences of leaps commonly used in gymnastics.

Figure 1. Basic Body Positions Used in Gymnastics:
(a) Tuck, (b) Pike (Stoop), (c) Straight (Layout), (d) Straddle, (e) Shoulder Planche, (f) Stag, (g) Lunge

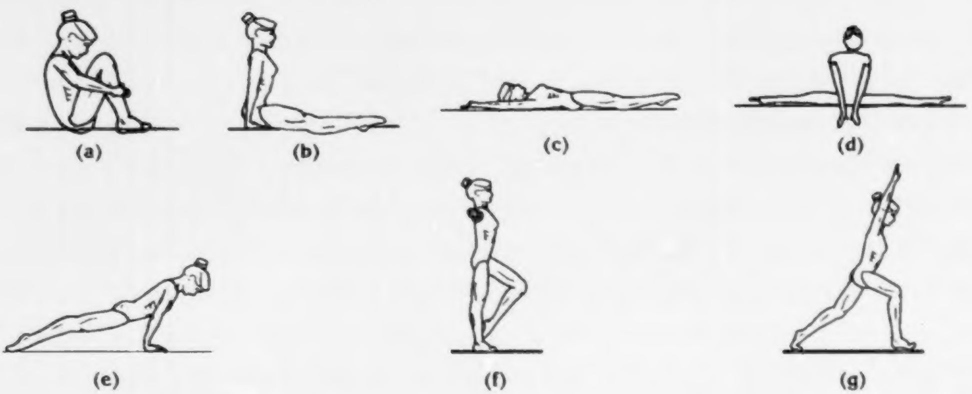


Figure 2. Basic Vertical Balancing Skills
(a) Front Scale, (b) Back Scale, (c) Arabesque, (d) Attitude Scale,
(e) Knee Scale, (f) Side scale, (g) Needle Scale. (h) "Y" Scale

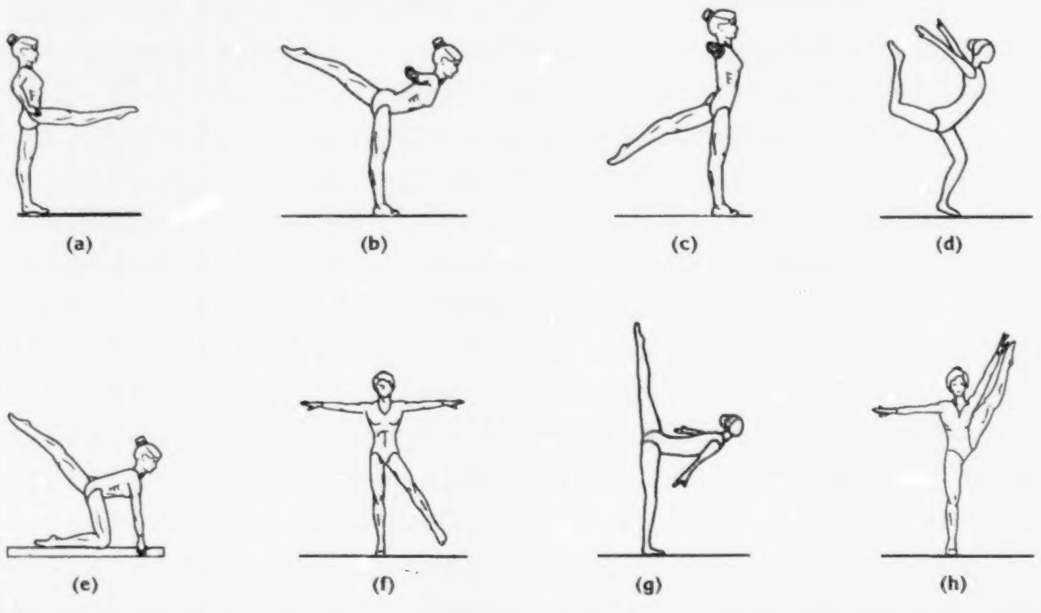


Figure 3. Basic Inverted Balancing Skills
(a) Tripod (Frog Headstand), (b) Headstand, (c) Tip-Up,
(d) Handstand, (e) Handstand Pirouette, (f) Press handstand

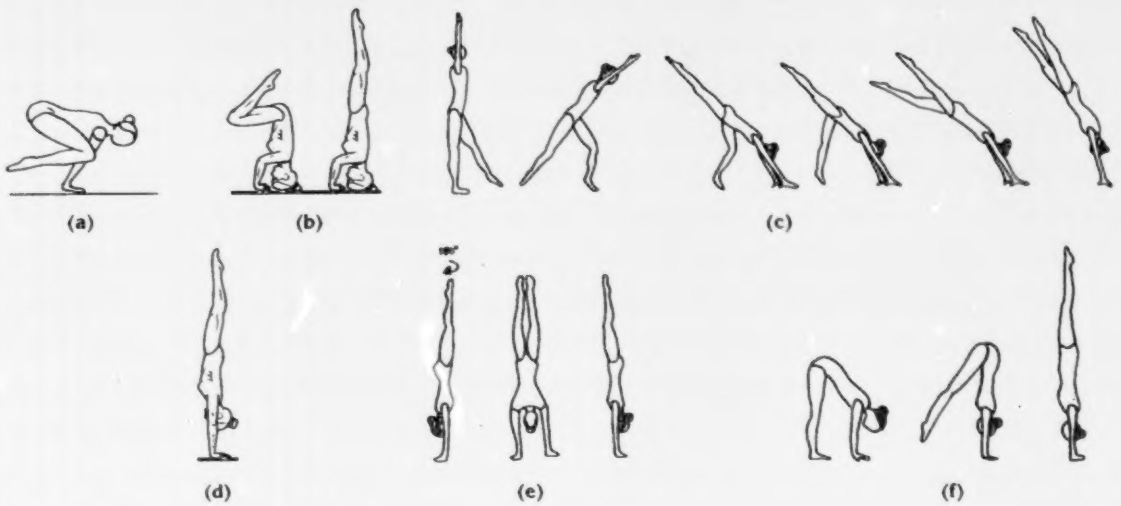


Figure 4. Other Basic Balancing Skills
(a) L-Hold (Pike), (b) L-Hold (Straddle), (c) V-Sit Variations (Open, Closed, Stag, and Abstract)

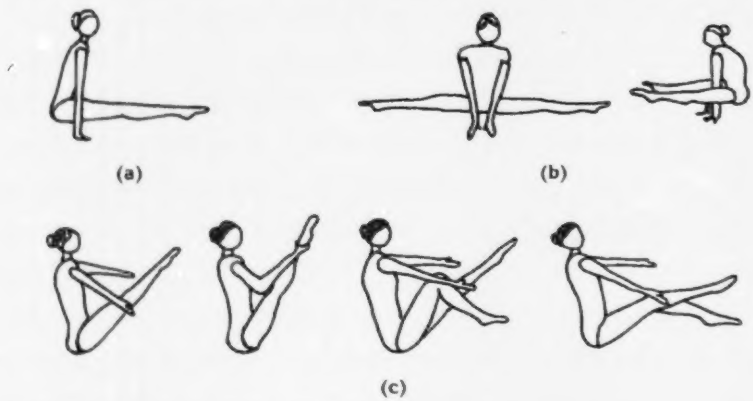


Figure 5. Five Basic Foot Placement Positions for Dance

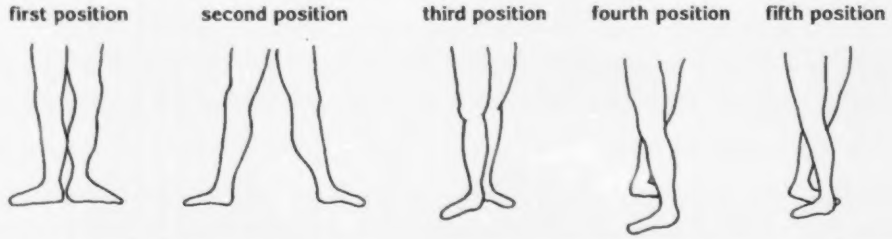

first position
second position
third position
fourth position
fifth position

**Figure 6. A Sampling of Basic Gymnastics/Dance Leaps
(a) Split Leap, (b) Side Split Leap, (c) Stag Leap (Front Leg Flexed),
(d) Reverse Stag Leap (Back Leg Flexed)**

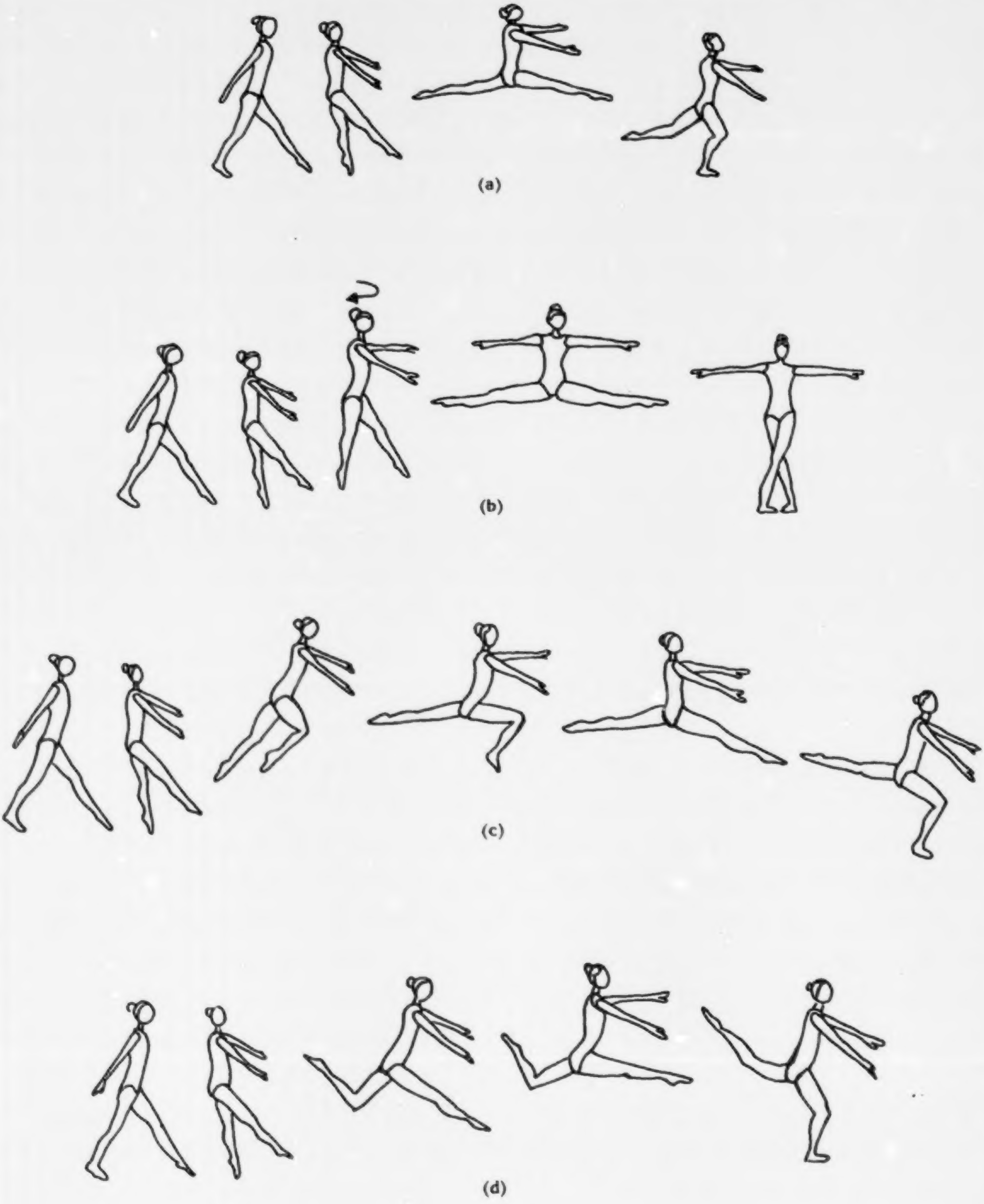
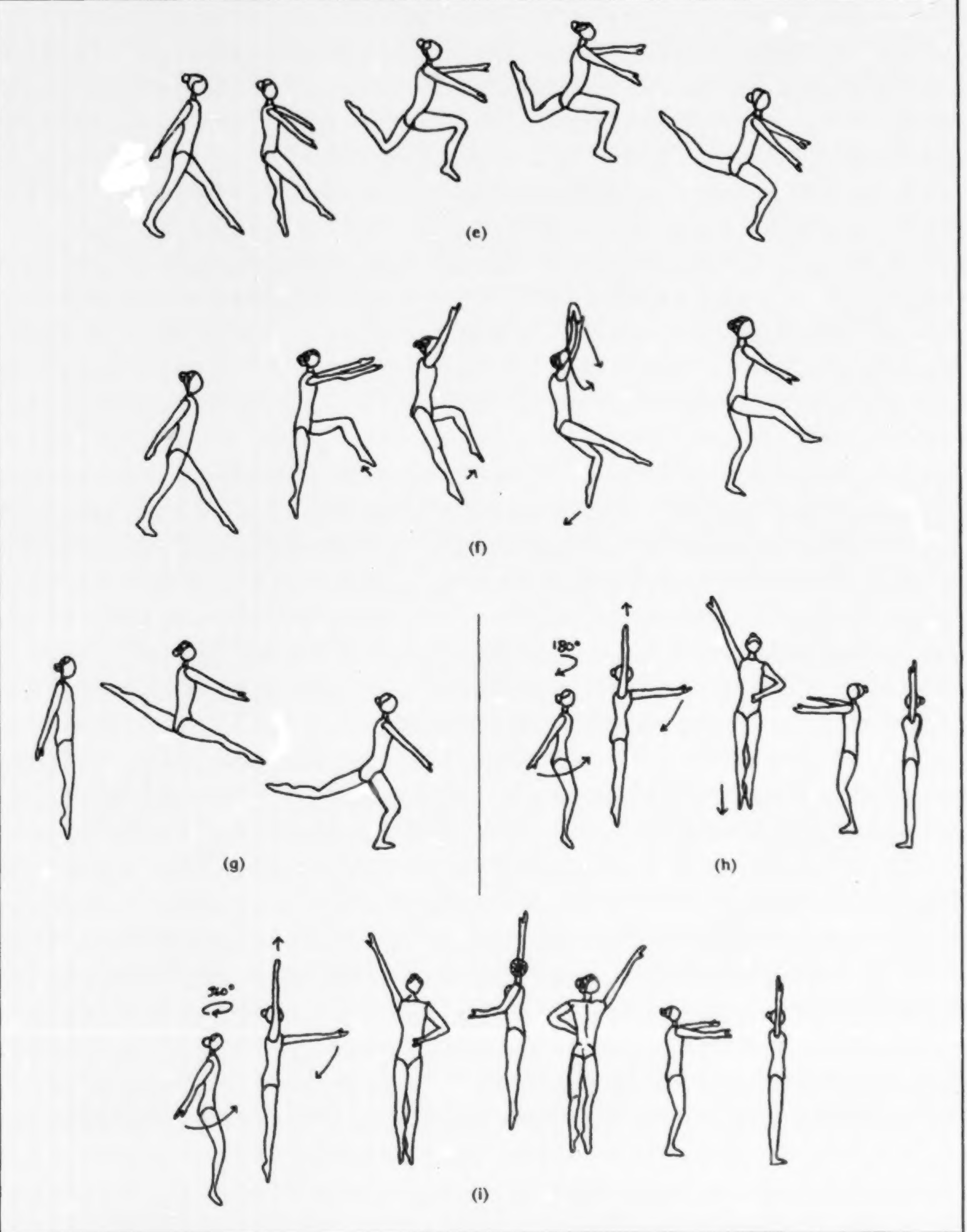


Figure 6. A Sampling of Basic Gymnastics/Dance Leaps (Continued)
(e) Abstract Leap (Both Legs Flexed), (f) Cat Leap, (g) Sissone, (h) Jump Half Turn, (i) Jump Full Turn



Fitness Requirements

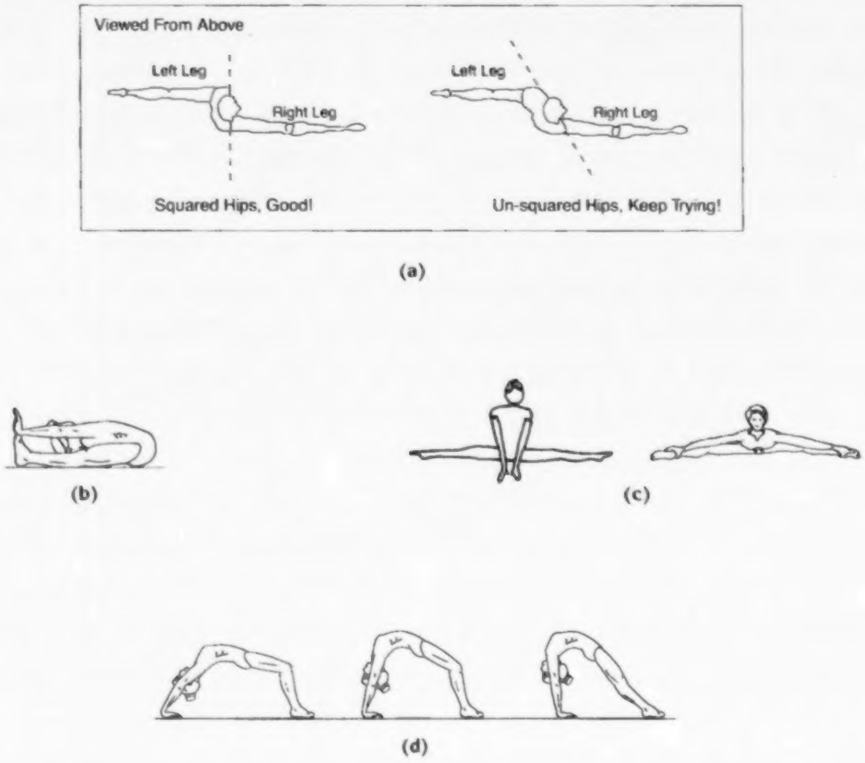
Flexibility

Flexibility is a vital part of tumbling. Improved flexibility not only helps with the performance of skills, it most likely helps to avoid injuries. Furthermore, flexibility is essential not only in such obvious skills as front and back walkovers, where left and right splits can be clearly seen as part of the skill, but also in skills such as a side aerial where the back leg drives into a needle scale (i.e., vertical split) to begin the skill with sufficient force to allow the aerial to be completed. The inability to drive the back leg into a needle scale with the hips "square" (see Figure 7a) reduces the performer's power and/or causes the skill to move sideways instead of straight ahead. Flexibility in a tight pike compression and/or straddle compression (see Figure 7b and 7c) allows better balance over the hands necessary for pressing to handstands. Shoulder flexibility allows vertical alignment in handstands and cartwheels. Correct shoulder flexibility in bridges (see Figure 7d) is absolutely essential for walkovers and back handsprings.

Flexibility can be improved not only by stretching to increase the range of motion of a joint but also by increasing your body awareness of how to extend your muscles in the same direction as the opening or closing of the joint angle, especially at the shoulder joint. Often, particularly in the inverted positions such as a bridge, the performer's muscles tighten to close the very angle that the stretch is trying to open because the performer has not yet learned to coordinate the muscle extension with the opening of the joint. In effect, the novice performer is tightening the muscles in the wrong direction, making the stretch painful and more limited in the range of extension.

Flexibility can be improved by stretching your muscles to the point where they tingle and then holding the stretch for a period of time ranging from a few

Figure 7. Correct vs. Incorrect Split Positions for Left Splits, Right Splits (Illustrated) and Straddle (Russian) Splits (a) Correct and Incorrect "Square Hips" in the Right Split, (b) Pike Compression, (c) Straddle Split; Straddle Compression, (d) Poor, Better, and Good Versions of the Bridge.



seconds to a few minutes, depending on your motivation to improve. If you feel sharp pains, ease up on the stretch to avoid injuring muscles or tendons. An excellent method of improving flexibility is to use proprio-neuro-facilitation (PNF) stretching techniques. This technique requires a mature partner to help you stretch. Your partner must be strong to help you stretch and prevent your limb from moving when you tighten your muscle. Your partner must also be serious enough not to bounce your stretch while at the same pushing hard enough to stretch you without injuring you. The technique requires that you stretch a muscle for five or six seconds and then attempt to close the joint you are stretching by tightening the muscle forcefully for five or six seconds while your partner prevents the joint from closing. Alternate the stretching and tightening for three to five times for each joint. You will find that the range of motion increases noticeably each time you stretch after tightening and that the pain of the stretch is dramatically reduced. Figure 7 illustrates the most common flexibility positions used in tumbling and gymnastics: left and right splits, straddle split, pike compression, and bridging.

Strength

Strength is also essential. Even a simple handstand or cartwheel requires that you support your body weight in the inverted position. Good form also requires strength. Lifting a straight leg requires more strength than lifting a bent leg. Explosive power is essential for the quick moves that are the foundation of tumbling.

Strength training is very specific. If you want to develop sufficient strength to perform a straight-arm back roll, you must perform a strength drill that uses straight arms while opening the shoulder angle. However, should you bend your arms in error, you should also have sufficient strength in the bent arm position to prevent your arms from collapsing. Similarly, if you want the strength to perform an explosive leg extension on a side aerial, you must practice explosive strength drills that extend the knee joint rapidly from the lunge position. If you want to be able to hold your body in a straight position during a handstand or a cartwheel, you must practice holding your body in alignment while holding that position. A list of strength drills for gymnastics could be virtually endless. Below are several important, but by no means exhaustive, categories of strength, along with several representative basic strength drills in each. For each strength drill, variations are suggested for making the basic drill easier or harder depending on the performer's readiness.

Arm and Shoulder Strength

Pull-Ups

Perform pull-ups from both an over-grip and an under-grip. The chin should be raised above the bar to count as a chin-up.

Easier variations

1. Bent-arm hang – have a partner lift you into a bent-arm position and hold this position as long as possible for up to 60 seconds.
2. Bent-arm lowering – have a partner lift you into a bent-arm position with your chin above the bar and lower to a straight-arm hang as slowly as possible, resisting the force of gravity.
3. Modified pull-ups – perform pull-ups on the uneven bars with your feet resting and partially supported on the low bar.

Harder variations

1. Reverse pull-ups – execute the pull-up to the back of your shoulders blades.
2. L-hold pull-ups – pike at the waist and execute a pull-up while holding your legs horizontal to the floor.

Push-Ups

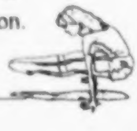
In a prone position from a straight-elbow support with the body held straight, lower the body to the floor by bending the arms and then extend the arms to return to the straight-elbow position.

Easier Variations

1. Support hold – hold the push-up position for 15 to 30 seconds.
2. Partial push-up – lower the body partially about halfway to the floor and return to the straight-body position.
3. Modified push-ups – start with the knees instead of the feet on the floor and execute the push-up.

Harder Variations

1. Elevated push-ups – start with the feet on an elevated mat with the shoulders over the hands, bend the arms to touch the chest lightly to the floor, and return to the support.
2. Modified handstand push-ups – start with the feet on an elevated mat so that the hips are over the shoulders, bend the arms to touch the head to the floor, and return to the support.
3. Handstand push-ups – with a partner supporting your legs and thighs, start in a handstand, lower to the floor, and return to the handstand position.



Dips

Stand between parallel bars or between two parallel beams placed approximately shoulder width apart and raised to at least elbow level. If necessary, a spotter should be positioned behind the performer and should assist at the hips to ensure the performer does not fall. From a straight-arm position, lower and raise the body by bending the elbows to a 90-degree angle.

Easier Variations

1. Shoulder shrugs – from the straight-arm support position, shrug the shoulders up and down with the elbows straight.
2. Partial dips – bend the elbows to less than 90 degrees and return.

Harder Variations

1. Planche dips – lift the hips as high as possible, creating an angle between the torso and the upper arms. Holding the hips elevated, execute the dip.

Abdominal Strength

Sit-Ups

The sit-up is one of the oldest yet most appropriate and effective ways to develop abdominal strength. Lie on the floor with the knees bent and the feet flat on the floor. Curl up until the chest touches the thighs. Curl down with the lower back, almost to the starting position, without allowing the shoulder blades to touch the floor.

Easier Variations

1. Do partial sit-ups by lifting the torso off the floor but not lifting the chest to the thighs.

Harder Variations

1. V sit-ups. These can be made progressively more difficult by opening and closing the V at greater and greater angles.
2. Do sit-ups on a slant board or a triangular mat with your head at the low portion of the incline and your feet at the high end.

L-Hold

(See Figure 4b)

Easier Variations

1. Lift the hips while the feet remain in contact with the floor.
2. Perform the L-hold while a spotter gently lifts and helps balance your feet.
3. Straddle hold – perform the lift in a straddle position with your legs outside the support hands instead of in a pike with your legs inside the support hands.

Harder Variations

1. Execute the L-hold on raised fingertips.
2. J-hold – lift the feet higher than the hips

Leg Strength

Straddle/Pike Jumps

Execute consecutive jumps by alternating between straddle jumps and pike jumps and rebounding as high and as vigorously as possible.

Running

Running is still one of the best leg-strength and power-developing exercises.

Skills

Each of the following skill presentations is organized as follows: First a skill is identified. Then, for each skill, the eight characteristics listed below are described. This "lesson plan" can be used for skills of virtually any difficulty, from the basic and intermediate skills described in this chapter to high-level skills used by competitive gymnasts working with advanced coaches. Similar skills are grouped together. Each description outlines the following:

1. Prerequisites for successfully performing a skill (e.g., strength, flexibility, body awareness, and essential prior skill learning and/or practice).
2. Progressions for teaching of a skill (i.e., the specific learning steps and/or skill breakdowns).
3. Teaching cues (such as verbal commands, feedback signals, and what to look for and/or how it feels).
4. Common errors typically made by students during the initial stages of learning, including those that slow learning and those that place the student at risk of injury.
5. Potential risks and/or hazards (i.e., where the likelihood of falling is greatest and what part of the body must be protected).
6. Appropriate spotting techniques (i.e., where the spotter should stand relative to the apparatus and the gymnast, where to place the hands, and what mistakes should be anticipated).
7. Self-analysis questions for the student to assess

whether the critical components of the skill have been correctly performed.

8. A brief list of selected variations.

Forward Roll - Tuck Position

(See Figure 8a)

Prerequisites

1. Requires the ability to hold the knees tucked reasonably tightly to the chest while rolling.
2. Must have the strength and body awareness to use the hands to protect the head and neck until the body weight has passed beyond the neck while upside down.

Progressions for Teaching:

1. From a stand, squat and place your hands on the mat, shoulder width apart and approximately an arm's length from your feet.
2. Place your chin on your chest and elevate the hips by pushing with your legs.
3. Push the hips up and over your head while placing your weight on your hands.
4. As the hips pass forward over your head, use your arms to gently lower your shoulders back to the mat, keeping the shoulders and back rounded.
5. Remain in a tight tuck with your heels held close to the buttocks and continue rolling forward until you come to your feet.
6. Reach forward and up with your arms as you finish in a standing position.

Teaching Cues

1. Look for your stomach as you initiate the roll.
2. Keep your body tightly tucked throughout the roll.
3. Move continuously into the roll; roll as fast as you feel safe and in control; do not stop in the middle.
4. Lifting the arms vigorously at the end of the roll when your feet touch the ground helps you to stand.
5. The "rounder" you maintain your body shape in the tuck, the smoother the roll.

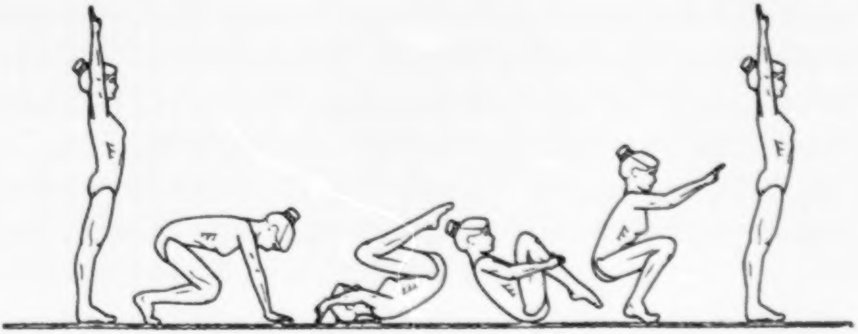
Common Errors

1. Looking at the ground in front of you too long instead of looking for your belly button.
2. Going too slowly to allow you to continue through to a standing position.
3. Failing to maintain the tightly tucked rounded body position.
4. Using your hands to push off the ground while attempting to stand instead of lifting up overhead (an action that allows you to push more effectively with your feet while trying to stand.
5. Not pushing vigorously enough with the feet to propel your hips beyond your head and neck while upside down.

Potential Risks and/or Hazards

1. Stopping in an upside down position while the body weight is directly above the head and neck.
2. Trying to stand too early in the roll and, thus, falling backwards. (A safe fall involves keeping the thumbs in to the body and fingers pointed toward your toes rather than reaching back with the thumbs turned out.)
3. Rolling sideways instead of forward in a straight line.

Figure 8a. Forward Roll



Appropriate Spotting Techniques

1. Assist the performer by placing a hand behind the head to ensure it is tucked toward the chest while simultaneously using the other hand to gently support the hips and guide the body weight beyond the head and neck.
2. Be certain not to lift the hips too vigorously. Doing so makes it difficult for students to support their body weight with their hands and often frightens beginners by increasing the speed of the roll before they have experienced the skill.

Self-Analysis Questions:

1. Were the hands placed properly in front of the body? ☐ Yes ☐ No
2. Did the hips elevate before initiating the roll? ☐ Yes ☐ No
3. Was the head tucked with the chin on the chest? ☐ Yes ☐ No
4. Did the arms lower the body to the mat with the shoulders making contact with the mat before the lower back? ☐ Yes ☐ No
5. Were you able to stand without using your hands to push off the floor? ☐ Yes ☐ No

Variations

1. Start the forward rolls in a straddle or stoop position.
2. Lunge to a tucked forward roll (the straight leg should be dragged across the floor until it meets the opposite leg, which is now also extended).
3. From the lunge position, execute the forward roll in a tightly compressed pike position and finish in a stand without bending the knees by lifting the arms vigorously over the head.
4. Continuous straddle-to-straddle forward rolls (stay tightly compressed at the hips while maintaining as wide a straddle as possible and use the hands in between the legs to push off the floor to provide sufficient momentum to continue into each successive roll).
5. Pike to pike forward roll (also called a stoop forward roll).
6. Forward roll from a scale position.
7. No-armed forward roll (start by extending the arms and touching the back of the hand on the mat to control the descent into the roll. See Figure 8b). As control and confidence increases, roll with less and later contact of the back of the hands on the mat until no contact is necessary (see Figure 8c).

Backward Roll

(See Figure 9)

Prerequisites

1. Requires sufficient upper body and arm strength to safely support the body weight over the head and neck.
2. Requires sufficient abdominal strength to draw the knees up to the chest and hold the tucked position while rolling backwards.

Progressions for Teaching:

1. From a stand, squat and place the hands slightly above the shoulders, with the palms facing the ceiling, the elbows held closely to the body, and the fingers pointed backwards over the shoulders.
2. Rest the chin on the chest and look forward toward the knees while rolling backwards.
3. Maintain a tightly tucked position with a rounded back.
4. As soon as your palms contact the floor, push against the floor while extending your elbows to support your body weight.
5. While pushing with the arms, quickly place the feet on the floor.
6. As soon as the feet are firmly on the floor and your weight has passed completely beyond the head and neck, rise to a standing position.
7. Using an incline mat to initially perform this skill on a downhill incline is often quite helpful to reduce pressure on the head and neck and to decrease the energy required to successfully perform the roll.

Teaching Cues

1. Look forward, not back, while rolling back. This helps maintain the tuck position, prevents you from hitting your head on the floor, and helps you maintain an awareness of where you are while upside down.
2. Bring your feet over your shoulders; do not shoot them early up into the air.
3. If you get stuck or feel too much pressure, roll sideways over your shoulder away from the spotter.

Figure 8b. No Handed Forward Roll Progression

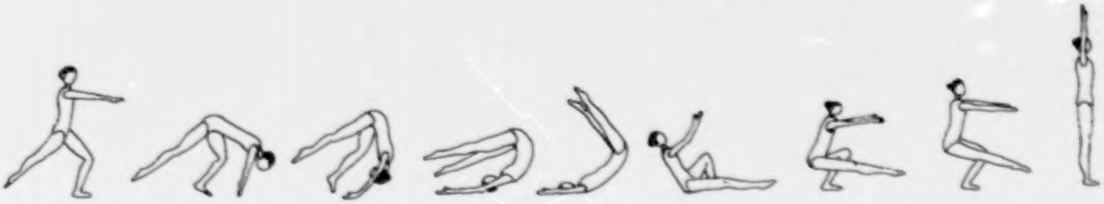


Figure 8c. No Handed Forward Roll

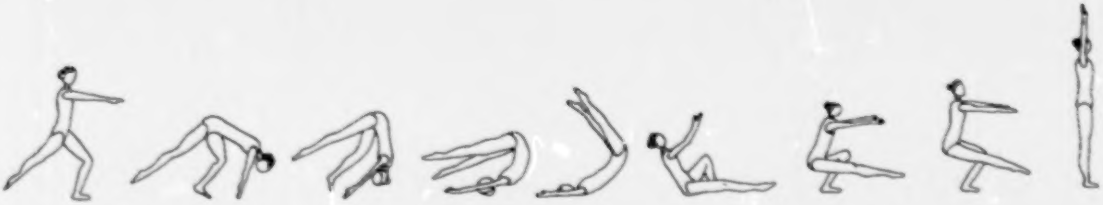
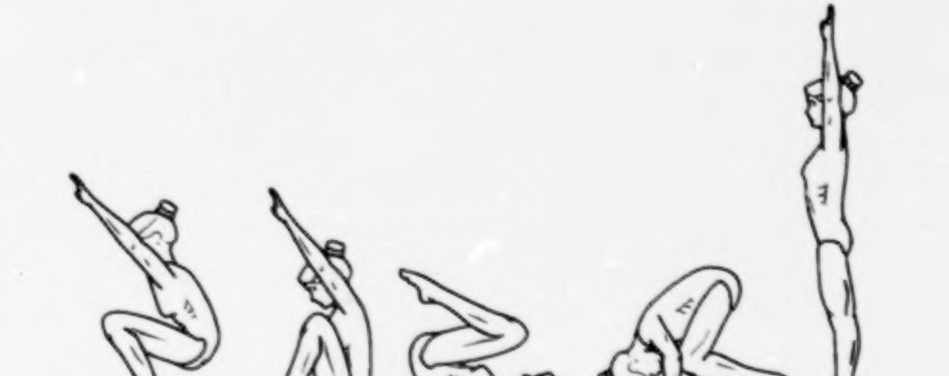


Figure 9. Backward Roll



Common Errors

1. Throwing the head backwards in the direction of the roll, causing the tuck to open and the performer to become disoriented and increasing the likelihood of bumping the head against the mat, stopping the roll.
2. Trying to open too early, resulting in the feet shooting towards the ceiling as opposed to being pulled over the shoulders and landing on the floor.
3. Failing to place the palms in the appropriate position to allow the body weight to be supported on the hands in order to protect the head and neck.
4. Rolling too slowly to provide sufficient momentum to allow the body weight to pass safely beyond the head and neck.
5. Placing the backs of the hands on the mat as opposed to the palms of the hand.

Potential Risks and/or Hazards

1. Too much pressure on the head and neck resulting from rolling too slowly and/or opening the backward roll too early.

Appropriate Spotting Techniques

1. Kneel at the performer's side.
2. The spotter's hand should be placed on the student's stomach and, as the backward roll is initiated by the student, the spotter should lift up as the hips of the student rise above the shoulders so as to minimize the weight on the head and neck as the body passes through the upside-down position.

Self-Analysis Questions

1. Was the body tightly tucked at the beginning of the skill? ☐ Yes ☐ No
2. Did the body remain tucked throughout the skill? ☐ Yes ☐ No
3. Did the elbows remain close to the body throughout? ☐ Yes ☐ No
4. Did the arms push evenly after contacting the floor? ☐ Yes ☐ No

Variations

1. Backward roll tuck to stand.
2. Backward roll, tuck position to straddle stand.
3. Backward roll to straight leg stand.
4. Backward roll starting and finishing in a straddle position.
5. Straddle backward roll to straight leg stand (pike).
6. Straight leg backward roll to straight leg stand (pike).
7. Backward roll to knee scale.
8. Backward roll to front scale.
9. Backward roll to handstand.
10. Backward roll to straight-arm handstand.

Back Roll to Extension

(See Figure 10)

Prerequisites

1. Ability to perform a backward roll with speed and control.
2. Ability to perform a controlled handstand.
3. Sufficient upper body strength to perform a handstand push-up.

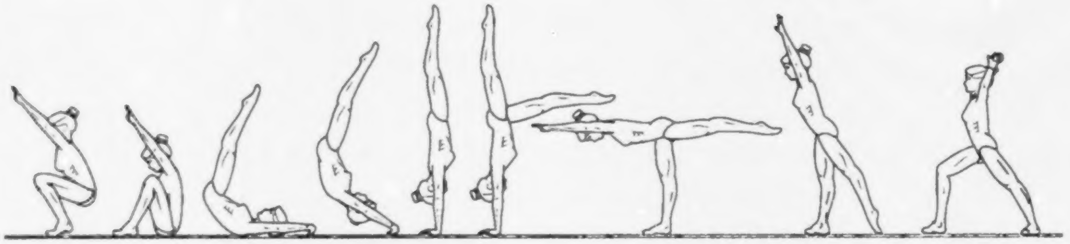
Progressions for Teaching

1. From a standing position, squat and move immediately into a back roll, tuck position.
2. As in the backward roll, the chin should be tucked forward toward the chest, with the elbows held close to the body and the back held in a rounded position to permit a smooth, fast rolling action during the backward roll.
3. As the hands contact the floor, extend the elbows by pushing vigorously against the floor as the hips pass over the head. At the same time, open the hip angle and shoot the legs toward the ceiling.
4. Keep the head in a neutral position, permitting the body to remain straight.

Teaching Cues

1. Increase the speed of the roll by dropping quickly from the standing position.
2. Anticipate the quick push against the floor with the arms. The total opening action should have an explosive quality.
3. Shoot the legs in a direction that feels beyond the vertical, enabling you to arrive in the vertical position. Shooting straight up as the handstand is rising causes you to be short of the vertical.

Figure 10. Backward Roll to Extension



4. Keep the head neutral; raising it to look at the floor causes early, excessive arching, resulting in the handstand falling back in the direction from which you started.

Common Errors

1. Opening too early before the hips pass over the head and neck, causing the handstand to be short of vertical and to fall back in the direction from which you started.
2. Opening too late and/or too slowly, resulting in the handstand passing beyond vertical or being incomplete.
3. Lifting the head as you shoot to the handstand, causing the back to arch and the handstand to fall back in the direction from which the roll started.
4. Attempting to shoot the legs directly up rather than shooting past the vertical, resulting in a failed attempt at the handstand.

Potential Risks and/or Hazards

1. Collapsing on the head and neck because of incomplete straightening of the arms as the handstand is attempted.

Appropriate Spotting Techniques

1. Stand to the side of the performer near the spot where the performer's hands will contact the floor.
2. As the performer begins the extension into the handstand, grasp the nearest thigh with both hands and lift upward to help support and guide the performer to the vertical handstand. Be careful not to lift the performer off the ground or to lift so vigorously that the performer has difficulty pushing against the ground. Anticipate the need to support the body weight if the performer's arms do not straighten completely.
3. Be aware of the following:

   An early push and/or extension by the performer may cause a fall back in the direction from which the skill started. If so, quickly slide your hand down from the thigh to the performer's lower back to support the performer as he/she lands in either a bridge position or executes a forward roll out.

   A late push and/or extension will often cause the performer to land in a push-up position. If the performer has already passed the vertical position, quickly shift your hand from the front of the thigh to the performer's hips or stomach to break the fall and allow the performer to step down.

Self-Analysis Questions

1. Did you have sufficient speed during the back roll to assist in the shoot to the handstand? ☐ Yes ☐ No
2. Was the opening at the right time and in the right direction (as opposed to too early or too late)? ☐ Yes ☐ No
3. Did the arms push the floor and the legs shoot toward the vertical explosively? ☐ Yes ☐ No
4. Did you keep your head neutral to avoid arching or piking? ☐ Yes ☐ No

Variations

1. Back roll to extension and step out with one leg.
2. Back roll to extension, balance momentarily, and roll out forward.

3. Back roll to extension, straight arms on the extension.

Headstand

(See Figure 11)

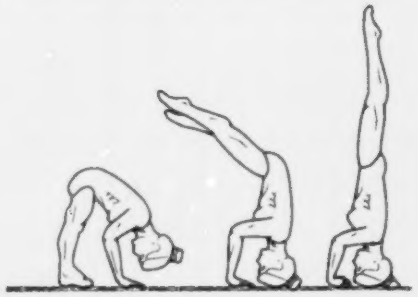
Prerequisites

1. Sufficient strength to support the body on the head and hands without excessive bending of the neck.
2. Ability to balance a frog stand.

Progressions for Teaching

1. Start in a squatting position and place the hands and front knee on the floor. The hands should be placed about halfway between your knees and your head. Place your head on the mat so that your hairline is in contact with the mat. Your head and both hands should form an equilateral (equal sided) triangle on the floor. Be certain you can see your hands.
2. Slide the straight leg forward until your hips are above your head. Then slowly, and with control, lift the straight leg to a vertical position as the bent front leg begins to straighten, pushing the hips up into alignment with your head, neck, and back.
3. Once the body is aligned, lift the bent leg up to join the straight leg.
4. Keep the neck straight throughout this movement.
5. Use the fingers and heel of the hands to maintain balance.
6. Come down from the headstand in one of two ways:
    a. Step down, reversing the direction in which the handstand was initiated while pushing the head and chest to a vertical stand by extending your arms.

Figure 11. Headstand



    b. Forward roll out, allowing the body to fall beyond the vertical line. When your center of gravity (i.e., your balancing point) has fallen beyond your head and neck, pull the chin toward the chest, bend at the hips, and continue the fall into a forward roll to a standing position.

Teaching Cues

1. Make an equal-sided triangle with your head and arms.
2. Never let your back arch.
3. Keep your spine as straight as possible to help support your weight safely.
4. Balance in a position just slightly short of the vertical so that you can hold the headstand steady by pushing with the palms of the hand on the floor.

Common Errors

1. Lifting the head to look at the floor.
2. Kicking too hard into the headstand, propelling the hips beyond the vertical line.
3. Arching the back in the handstand.
4. Placing the hands on the mat in a straight line with the head; in effect, eliminating the triangle necessary for maintaining balance.

Potential Risks and/or Hazards

1. By lifting the head, the neck and spine are exposed to the possibility of being hyperextended by the weight of the body.

Appropriate Spotting Techniques

1. Stand within an arm's length of the performer's side, facing him or her.
2. Grasp the performer's thigh with both hands as the leg attains the vertical position; avoid grasping the leg above the knee because of the strong possibility of beginner gymnasts bending their knees.
3. If the performer chooses to roll out, the spotter should guide the legs in a vertical position slightly beyond the balancing point of the head and neck before allowing the thighs to drop into the forward roll.

4. If the performer chooses to return to the original starting position by stepping down, the spotter must switch his or her grasp from the thigh to under the performer's hips to control the rate of descent until the performer has regained balance.

Self-Analysis Questions

1. Did the hands and head form an equal-sided triangle? ☐ Yes ☐ No
2. Were the hips placed directly above the head? ☐ Yes ☐ No
3. Did the neck remain straight throughout? ☐ Yes ☐ No
4. Did relaxed neck and back muscles cause an arch to occur? ☐ Yes ☐ No
5. Did the legs lift in a controlled manner? ☐ Yes ☐ No
6. Was your body held straight at the top of the headstand? ☐ Yes ☐ No
7. Was there an arch or pike in the body that pulled the headstand off balance? ☐ Yes ☐ No

Variations

1. Tripod to a headstand, forward roll out.
2. Tip-up headstand, forward roll out.
3. Kick-up to a headstand, forward roll.
4. Kick-up to a headstand, to a stag position (a pose with one leg bent at the knee and the foot of the bent leg placed against the straight leg), forward roll out.
5. Kick-up to a headstand, to a double stag, forward roll out.
6. Straddle to a headstand, forward roll out.
7. Drag-up to a headstand (start in a prone position with the hands by the shoulders; drag the hips over the head while keeping the legs straight throughout the entire movement). Without bending the knees, press the legs up over the hips to the headstand position.

Handstand

(See Figure 12)

Prerequisites

1. Ability to support the body weight on the arms regardless of whether the elbows are bent or straight.

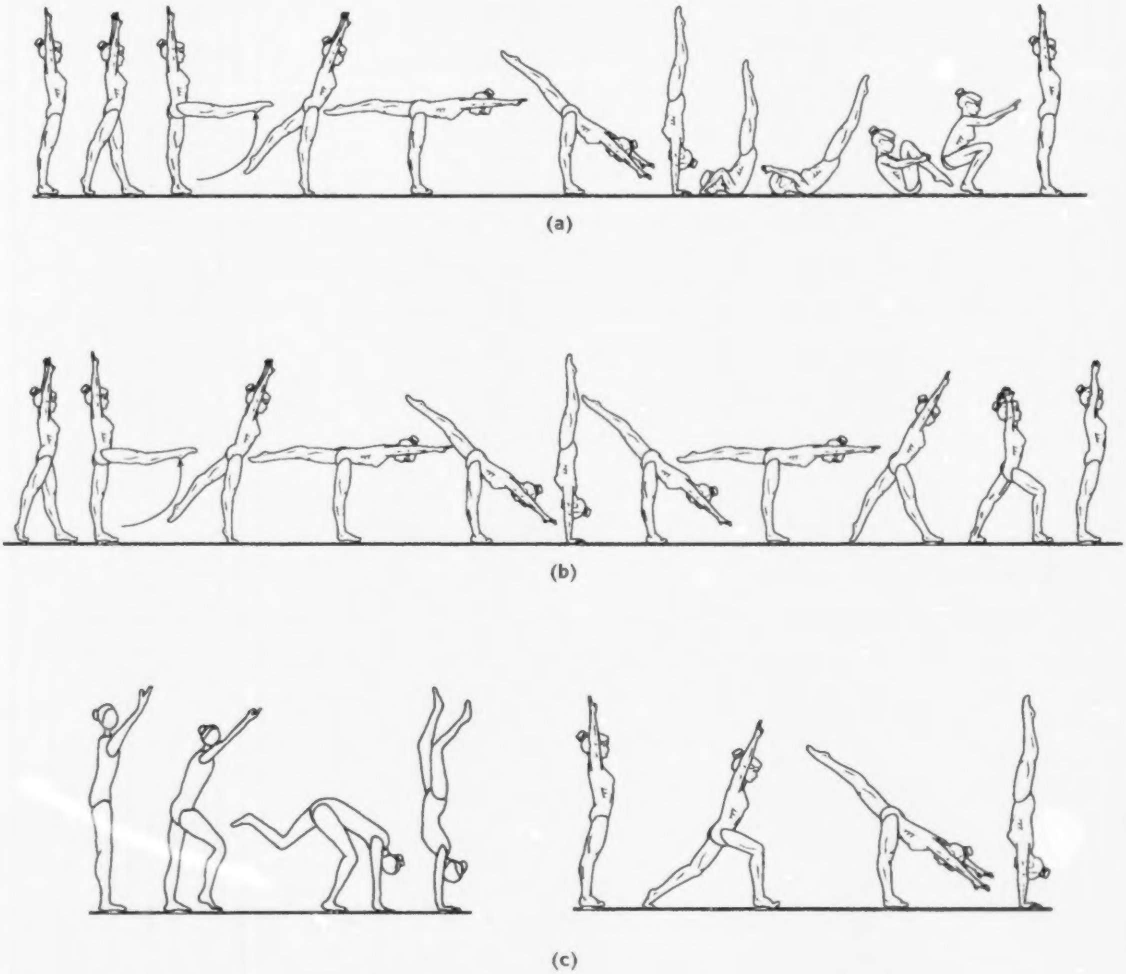
Progressions for Teaching

1. From a standing position, step forward into a lunge position with the arms held overhead in a straight line with the shoulders and spine.
2. Bend forward at the waist while lifting the back leg and placing the hands on the floor shoulder width apart as far away from the lunge foot as possible while maintaining control.
3. Gently push off the forward (lunge) leg while continuing to lift the back leg to the vertical position.
4. Keep the arms straight throughout.
5. As the weight transfers to the hands, push off the floor with the lunge leg and straighten it while aligning it with the back leg so that both are in the vertical position.
6. The head should be held in a neutral position, neither raised too high, thus creating an arch, nor tucked forward with the chin on the chest, thus making it impossible to see the floor.
7. Keep the back flat, with no arch or pike.
8. Come down from the handstand in one of three ways:
    a. Step down – split the legs and step back down to a lunge position, reversing the direction from which the handstand was initiated. Push your head and chest to a vertical position by extending your arms.
    b. Forward roll out – allow the body to fall beyond the vertical line. You're your center of gravity (i.e., your balancing point) has passed beyond your head and neck, bend the arms in a controlled descent, pull the chin toward the chest, bend at the hips, and continue the fall by rolling into a forward roll to a standing position.
    c. Pirouette 1/4 turn – as the body passes beyond the vertical position, pirouette on your hands 90 degrees and step down to the side.

Teaching Cues

1. Look for the floor through your eyebrows without lifting your head.
2. Overbalance the handstand slightly and maintain your balance by pushing hard with your fingers.

Figure 12. Handstand
(a) Lunge to a Handstand to a Forward Roll, (b) Lunge to a Handstand, Step Down to a Lunge, (c) Poor vs. Good Handstand Technique.



3. Reach as far from your lunge foot as possible with your hands so that the body can "swing up" into the handstand.
4. Look for the floor mat at a point directly between your hands.

Common Errors

1. Attempting the handstand with bent arms.
2. Excessive arching or piking.
3. Placing the hands too close to the lunge foot.
4. Raising the head.
5. Pushing too aggressively on initial attempts to reach the handstand.

Potential Risks and/or Hazards

1. Collapsing onto the head or neck because of bent arms or excessive arching.
2. Falling beyond the handstand, out of control, and landing flat on your back instead of rolling out.

Appropriate Spotting Techniques

1. The spotter should stand to the side and slightly in front of approximately where the performer's hands will be placed.
2. As the performer kicks to the handstand, grasp the performer's thigh with both hands to prevent the performer from passing beyond the handstand position and to help support the performer's weight. The spotter should make contact with the performer before the performer's feet have left the ground. Doing so reduces the stress on the spotter and typically increases the performer's confidence that the spotter is helping with the control of the handstand.
3. Avoid lifting the performer to the vertical position if the performer has not pushed hard enough to reach that vertical.
4. If the performer chooses to step down out of the handstand, the spotter should shift the grasp of the thigh to supporting the hip and stomach until both feet are on the ground and balance has been re-attained.
5. If the performer chooses to roll out, the spotter should maintain the grasp on the thigh, guiding the torso beyond the neck and head and lowering the body at a controlled rate of descent.
6. Avoid spotting by standing in front of the gymnasts so that, as the gymnast attains the handstand, the gymnast's back is toward the spotter. Although this technique is frequently used by experienced gymnastics coaches working with experienced gymnasts, novice performers frequently bend their knees while in the inverted position, dramatically increasing the likelihood of kicking the spotter in the face with the heel of the foot.

Self-Analysis Questions

1. Did you begin with a strong lunge?
   ☐ Yes ☐ No
2. Did you reach as far from your lunge foot as possible? ☐ Yes ☐ No
3. Did you hold your body in a straight line from your hands through your torso to your back leg?
   ☐ Yes ☐ No
4. Did you lift your back leg into the vertical position? ☐ Yes ☐ No
5. Did you maintain a straight body position while upside down? ☐ Yes ☐ No
6. Could you see the floor without lifting your head?
   ☐ Yes ☐ No
7. Were you able to balance your handstand for at least 3 seconds without breaking form or moving your hand positions? ☐ Yes ☐ No

Variations

1. Handstand to a stag position.
2. Handstand to double stag pose.
3. Handstand snap down.
4. Forward roll to the handstand.
5. Backward roll to a handstand (back extension roll).
6. Side handstand (half a cartwheel).
7. Handstand to a split.
8. Handstand pirouette.
9. Press to a handstand from a straddle hold or L-hold.

Cartwheel

(See Figure 13)

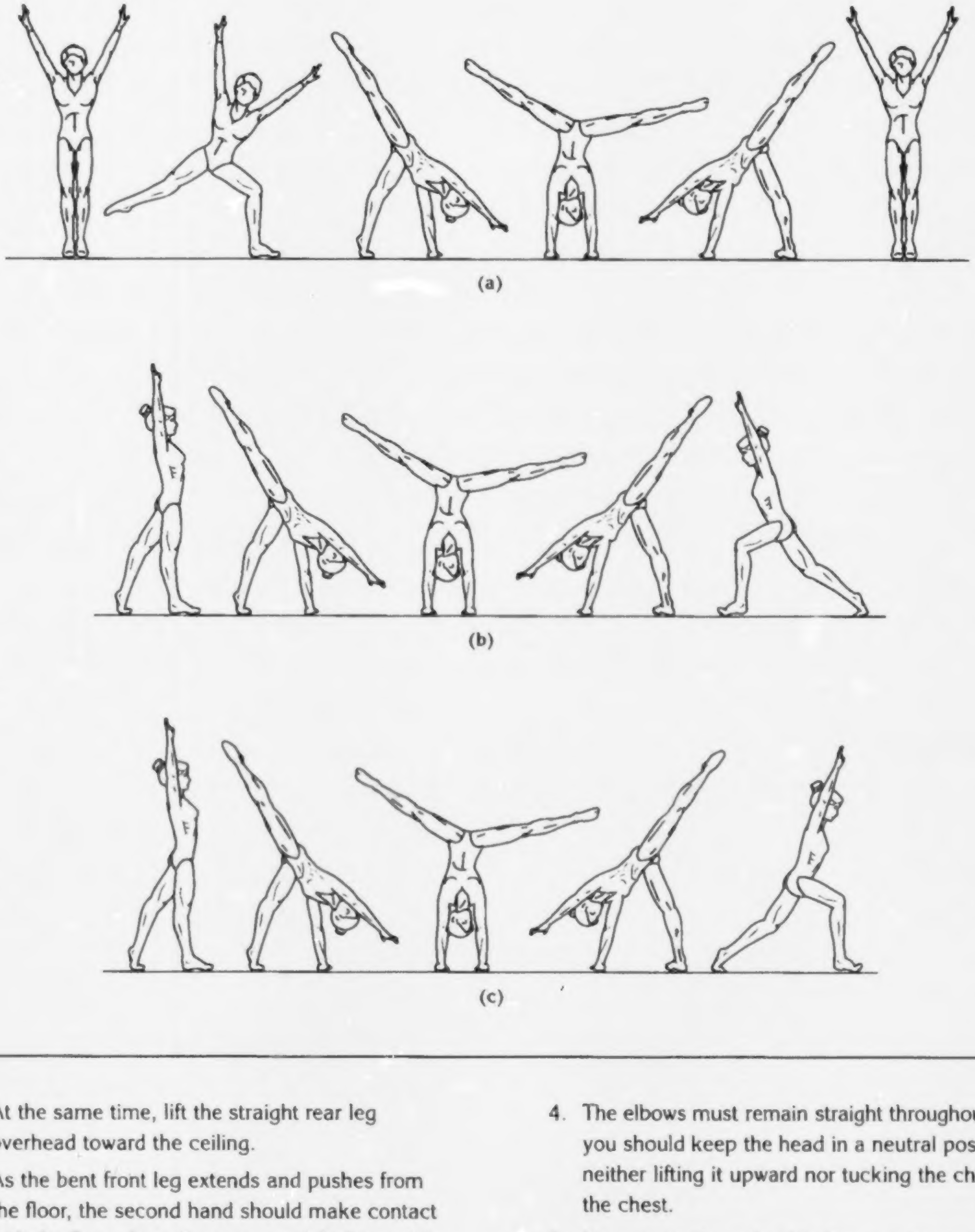
Prerequisites

1. Requires the ability to support your entire body on your hands without collapsing.
2. Assumes the ability to perform a handstand.
3. The ability to perform a Russian Split is helpful but not essential.
4. Students should have attempted a mini-cartwheel where the body weight does not pass directly overhead; i.e., they step sideways into a partial handstand where the body does not pass directly over the head but is short of the vertical, allowing them to step down at right angles to the original direction of the mini-cartwheel. Students should demonstrate the ability to safely support their body weight and the confidence to make a smooth, unhesitating attempt before moving on to the full cartwheel.

Progressions

1. Lunge to a side and place the closest hand on the floor approximately arm's length from the bent front lunge foot in a straight line extending away from the foot.

Figure 13. Cartwheels
(a) Side Cartwheel, (b) Cartwheel 1/4 Turn In (c) Cartwheel 1/4 Turn Out



2. At the same time, lift the straight rear leg overhead toward the ceiling.
3. As the bent front leg extends and pushes from the floor, the second hand should make contact with the floor along the same straight line established by the first hand down. The hand placement on the floor should be a minimum of shoulder width apart and preferably more. The body should now be in a straddle handstand.
4. The elbows must remain straight throughout, and you should keep the head in a neutral position, neither lifting it upward nor tucking the chin on the chest.
5. Your momentum should allow you to pass smoothly through the vertical position until the first leg over the head contacts the floor.
6. The first hand down now pushes off the floor and lifts over the head.

7. Now the second hand lifts off the floor, also to the overhead position, and, finally, the pushing leg will land on the floor along the same straight line.

Teaching Cues

1. A left-leg lunge requires that the left hand be placed down on the floor first. A right-leg lunge requires the right hand to be placed first. Alternate hand, hand, foot, foot placement with a definite rhythm or cadence in a 1, 2, 3, 4 count.
2. Place the first hand down as far away from the lunge foot as possible.
3. The second hand down is placed as far from the first hand as possible.
4. Look for the floor "through the eyebrows" without raising the head excessively.
5. Use a straight line on the floor as a guide for hand and foot placement (i.e., draw a line with chalk or use an existing seam on a mat).

Common Errors

1. Opposite hand is placed down first.
2. Head is raised excessively, causing the back to arch and resulting in a loss of strength, balance, and direction.
3. Elbows bend excessively, causing the sensation of falling and the fear of collapsing.
4. The lunge occurs on a straight leg, preventing the student from pushing the body weight over the hands into the cartwheel.

Potential Risks and/or Hazards

1. Arms collapse, causing a fall to the head.

Spotting Techniques

1. Stand behind the gymnast so that, as the cartwheel is initiated, the gymnast's back is towards the spotter and the spotter is located at the approximate position where the gymnast's hands will contact the mat.
2. As the wheeling action is initiated, the spotter's first hand supports the gymnast's hip during the lunge and push-off.
3. As the performer arrives in the inverted position, the spotter's second hand contacts the second hip and holds both hips. The spotter guides the performer in a straight line and facilitates the smooth passage of the performer's body weight over the hands.
4. Both hands guide and support the gymnast's body during the handstand phase.
5. The spotter's second hand supports the hips during the step-down phase at the completion of the skill until the performer has achieved a balanced standing position.
6. The spotter should anticipate an arch in the student's back and a bending of the leg during the handstand phase of the cartwheel. Such an error increases the possibility that the spotter may be kicked in the face or the chest by the gymnast's feet.

Self-Analysis Questions

1. Did you start with a strong lunge position? ☐ Yes ☐ No
2. Did you stretch forward as you placed your hands down on the floor? ☐ Yes ☐ No
3. Did you push off forcefully with your lunge leg? ☐ Yes ☐ No
4. Did you maintain a wide straddle throughout? ☐ Yes ☐ No
5. Did you maintain an even rhythm throughout (i.e., hand, hand, foot, foot)? ☐ Yes ☐ No
6. Did your cartwheel follow a straight line on the floor? ☐ Yes ☐ No
7. Did you finish with your hands overhead (to permit you to initiate a second skill out of the cartwheel)? ☐ Yes ☐ No

Variations

1. Cartwheel quarter turn in (facing the direction you started from) or quarter turn out (facing the direction you originally faced at the beginning of the cartwheel).
2. One-handed cartwheel using the near arm.
3. One-handed cartwheel using the far arm.
4. Dive cartwheel (arms use an underhand swing into the cartwheel).
5. Opposite side cartwheel (Be careful! These are often disorienting.).
6. Series of cartwheels.

Round-Off

(See Figure 14)

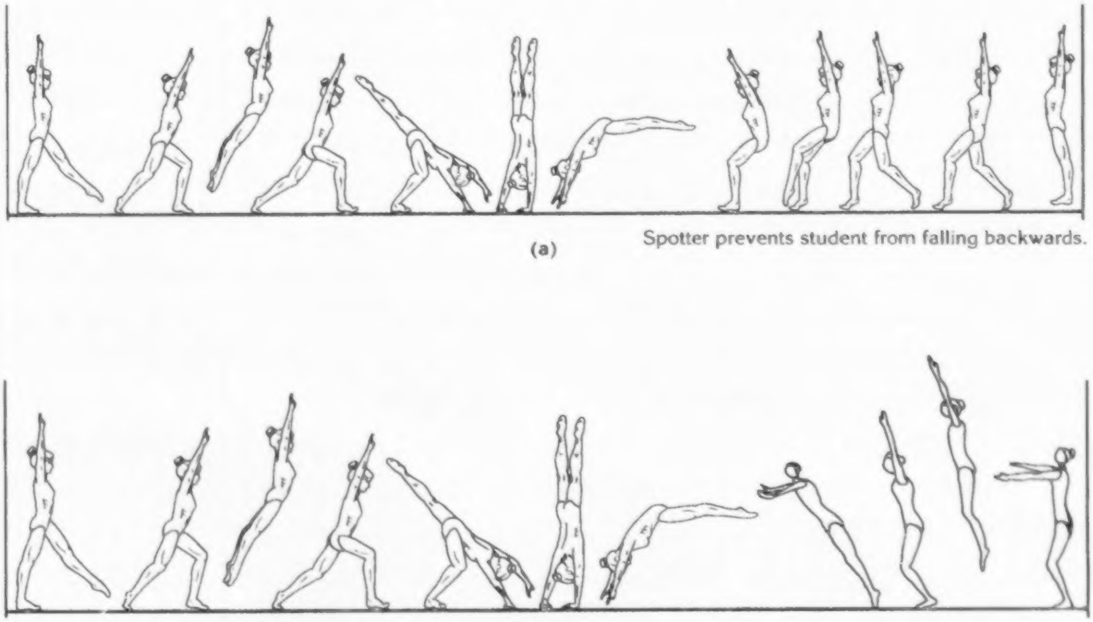
Prerequisites

1. Ability to perform a cartwheel quarter turn in.

Progressions for Teaching

1. The round-off begins in much the same way as a cartwheel quarter turn in but is initiated with much greater speed, often from one to three steps.
2. Start the lunge[2] with the knee in front of the ankle so that your lower leg is at a 45-degree angle to the floor. This position results in the push generating more forward than upward momentum.
3. Hand placement is quite varied, but, in general, the wider the hand placement, the more power you can generate. The fingers of the first hand down typically point back toward your lunge leg, whereas the fingers of the second hand typically face the same direction as your back does.
4. Your arms should remain in line with the shoulders and head rather than dropping to the floor and forming an incorrect sharp angle at the shoulders.
5. Drive the back leg to the vertical line.
6. Push off vigorously with the lunge leg and, as the second hand contacts the floor, snap the lunge leg up to meet the back leg before they hit the vertical. Bring the lunge leg up to the back leg as quickly as possible to provide the power to finish the snap-down required for the round-off. Bringing the legs together quickly also facilitates the pirouetting action required to permit the snap-down in the correct direction.

Figure 14. Round-Off
(a) Round-Off Block In with Spotter, (b) Round-Off Block Out to Rebound.



Spotter prevents student from falling backwards.

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[2] A hurdle is a step into the lunge position and is used to increased speed and power. There are two different types of hurdles: the **American Hurdle** (hurdle knee is held high in front and is lifted through very early into the lunge position) and the **European Hurdle** (hurdle leg is held behind with the step through to the lunge position occurring as late as possible).

7. The pirouette is completed as the feet now together pass through the vertical. Push off the floor with both arms while simultaneously snapping the feet down toward the floor with the body facing the direction from which it came.
8. There are two very important methods used in this last stage of the round-off called the snap-down, each serving a different purpose:
   a. Blocking Under – the feet are snapped down to the floor as close to the hands as possible so the hips are behind the feet, creating a backward momentum. Such a falling momentum is necessary if the next skill is a back handspring. This blocking under commits you to falling backwards and should not be done unless a spotter is standing behind you ready to catch you or you are continuing into a back handspring.
   b. Blocking Out – the feet are snapped down, landing away from the hands and behind the hips so as to stop the backward momentum and convert it to upward and rotational momentum. Blocking out is used if the round-off is to be followed by a vertical jump (low to moderate power) or a backward somersault (intense power).

Teaching Cues

1. Perform the round-off on a straight line extending in the direction of the run. Make certain the lunge step and the first hand down are on the same straight line as the run into the hurdle.
2. Take no more than one to three steps into the hurdle.
3. Keep the arms high by the head during the lunge to increase power and facilitate an understanding of the correct direction of the pirouetting action; do not drop the arms to the floor before the chest drives towards the floor. (Verbal cues are "Big lunge, no shoulder angle.")
4. Snap the feet together before reaching the vertical and before pirouetting.
5. Touch the ground with the lead hand before extending the lunge leg.
6. Snap the feet together before vertical.
7. Snap the feet down as close to the hands as possible for round-offs leading into back handsprings, or snap the feet down as far from the hands as possible for rebounds or back somersaults.
8. Finish with the arms extended high overhead in line with the shoulders and head.

Common Errors

1. Failing to step in a straight line during the lunge. Often the lunge leg steps across the body as the performer anticipates the turning action of the round-off.
2. Thinking a left lunge round-off is turning the left shoulder back rather than correctly realizing it turns the right shoulder back.
3. Running too many steps into the round-off in an ineffective attempt to generate more power.
4. Failure to drive the back leg vigorously enough to generate sufficient power.
5. Allowing the back to arch when the back leg is driven vigorously to the vertical.
6. Pirouetting before the feet come together before the vertical line, thereby slowing the pirouette.
7. Failing to snap down or snapping down with insufficient energy to continue into the next skill.
8. Extending the lunge leg before the lead hand touches the ground, resulting in a "diving round-off."
9. Dropping the hands down at the end of the round out so that they are near the hips instead of overhead. This error makes continuing into a back handspring or a back somersault difficult.

Potential Risks and/or Hazards

1. Snapping under while trying to stop.
2. Falling backwards and extending the hands behind during the fall with the thumbs turned out.
3. Incomplete 180-degree pirouette resulting in a sideways fall.

Appropriate Spotting Techniques

1. The spotter should stand on the same side of the performer as the performer's lead lunge leg and approximately where the performer's hands will be placed.
2. As the pirouette is completed and the feet have arrived on the ground, grasp the performer's hips with both hands to prevent over-rotation. Anticipate with the beginner that the direction of the body is misdirected either by over- or under-

rotating the pirouette from the desired 180 degrees.

3. If the performer has successfully blocked under, quickly switch one hand from the hips to the upper back to block the possibility of the performer over-rotating and falling to the back.

Self-Analysis Questions

1. Did you execute the lunge in a straight line? ☐ Yes ☐ No
2. Were the hands placed correctly in a straight line? ☐ Yes ☐ No
3. Did the arms remain next to or near to the head throughout the round-off? ☐ Yes ☐ No
4. Did the back leg kick forcefully? ☐ Yes ☐ No
5. Did the front, lunge leg extend and push off forcefully after the lead hand touched the ground? ☐ Yes ☐ No
6. Did the legs come together before they reached the vertical? ☐ Yes ☐ No
7. Did the pirouette begin after the legs snapped together and finish before the snap-down occurred? ☐ Yes ☐ No
8. Did the hands push vigorously from the floor and continue overhead as the feet made contact with the floor? ☐ Yes ☐ No
9. When you rebounded off your feet at the end of the round-off, were you able to land on the straight line, or did you veer to one side or the other? ☐ Yes ☐ No

Variations

1. One-handed round-off.
2. Slow round-off to a backward roll.
3. Round-off, block out to a straddle jump.

Bridge Kick-Over

(See Figure 15)

Prerequisites

1. Sufficient strength to hold the upper body weight off the floor without collapsing.
2. Sufficient flexibility in the shoulders to bridge to a point where the shoulders are directly above the support hands (further is desirable).

Progressions for Teaching

1. Start in an inverted position on your back with your feet on a raised mat (such as a folded panel mat), with the palms of your hands on the floor by your head about shoulder width apart and your fingers pointed in the direction of your feet.
2. With the palms of your hands, push down on the floor and toward your feet to elevate your head and chest into the bridge position.
3. Bridge the shoulders forward (i.e., move your shoulders beyond the hands, which serve as your base of support). The arms should remain straight throughout.
4. After your shoulders have moved beyond your hands (away from your feet), lift one leg (normally the lead leg of your best split) toward the vertical.
5. Push vigorously, but with as little flexing as possible, with the support leg and raise it to the vertical while the first leg continues over the head and chest until it reaches the floor.
6. Push off the floor with both hands while keeping the buttocks tight so the second leg remains extended from the hip. Keeping this leg in line acts as a counterbalance so that the arms, head, and chest arrive in an extended vertical, upright position without feeling heavy.
7. Once you can successfully perform the bridge over with the feet starting on the elevated mat, repeat the above steps with lower and lower mats until you can successfully complete the bridge over from starting on the floor level.

Teaching Cues

1. Direct the performer to push down and toward the feet.
2. Keep the arms straight at all times to increase strength and reduce fatigue.
3. Bridge the shoulders with as little back arch as possible.

Common Errors

1. Bending the arms in the support phase.
2. Placing the arms too wide.
3. Reversing the shoulders (i.e., allowing the shoulder to move back toward the direction of the feet rather than continuing to bridge beyond the base of support).
4. Ducking the head by placing the chin on the chest while kicking the leg over the base of support.

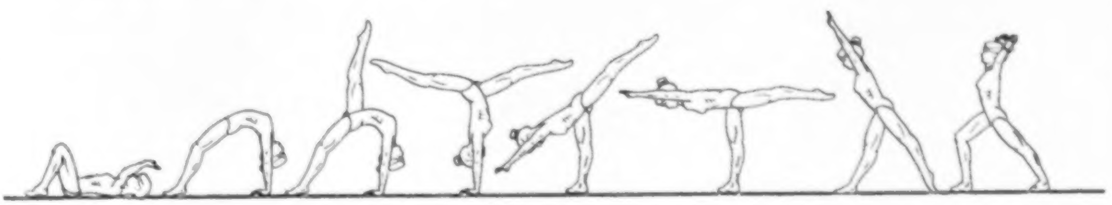


Figure 15. Bridge Kick Over

5. Excessive arching of the back rather than bridging the shoulders.

Potential Risks and/or Hazards

1. Collapsing on the head and neck because of bent arms or arms placed too widely apart.
2. Collapsing on the head and neck because the shoulders reverse, resulting in a planching (bending) of the shoulders.

Appropriate Spotting Techniques

1. Stand or kneel to the side of the performer with one hand (that's closest to the finishing point) on the lower back and the other under the thigh.
2. If the performer is heavy relative to your strength, reach under the entire back with your entire first arm.
3. As the performer attempts to kick the feet over the head, chest, and base of support, gently lift up and forward. Lifting the hips too high, hard, or fast will make it difficult for the performer to push successfully from the floor. Gently push the torso beyond the support position of the hands. Pushing too vigorously with a gymnast of limited flexibility hurts the gymnast and often results in the gymnast bending the arms and collapsing.

Self-Analysis Questions

1. Did my shoulders bridge beyond my hands?
   ☐ Yes ☐ No
2. Did I keep my arms straight throughout?
   ☐ Yes ☐ No
3. Were my palms shoulder width apart on the floor? ☐ Yes ☐ No
4. Did I keep bridging as my feet passed over my head and chest? ☐ Yes ☐ No
5. Did I finish with my arms extended over my head in the upright position? ☐ Yes ☐ No

Variations

1. Bridge over with switch leg.
2. Bridge over to handstand with feet together.

Back Bend

(See Figure 16)

Prerequisites

1. Must be able to support the upper body in a bridge position with straight arms and feet on the floor.

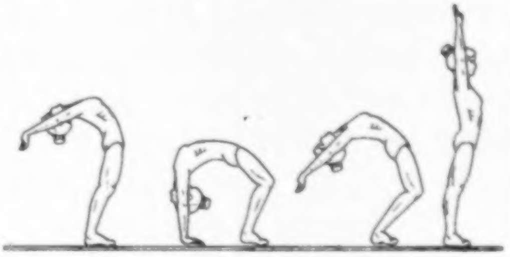
Progressions for Teaching

1. Stand with feet side by side, approximately shoulder width apart, with arms stretched toward the ceiling, stomach in, and head facing forward.
2. Stretch the fingertips up and back as you begin to arch the shoulders and the lower back. The head should move back while aligned with the arms as you begin to look for the floor at the point where your hands will land.
3. As you continue to reach backwards with your arms, move your hips forward to counterbalance the weight of your upper body over your base of support (i.e., your feet) to keep you from falling out of control.
4. As your hands contact the floor about shoulder width apart, bridge your shoulders forward beyond your hands
5. Return to the standing position by pushing your hips forward beyond your feet and stretching your arms to the ceiling, leading first with the chest, the shoulders, and the head and finally with the arms and fingertips.

Teaching Cues

1. Push your hips forward and feel the balance point as you begin to reach backwards.

Figure 16. Back Bend



2. Initiate the backward movement with your fingertips, not your head.
3. Bridge with the shoulders more than with the lower back.

Common Errors

1. Initiating the backwards movement with the head.
2. Not pushing the hips forward for balance as you begin to bridge backwards.
3. Arching the lower back excessively.

Potential Risks and/or Hazards

1. Falling heavily on the arms and collapsing on the head and neck.
2. By reaching widely with your arms as you fall backwards, the possibility exists of striking the spotter in the face with the back of your hand and/or arm.

Appropriate Spotting Techniques

1. Stand to the side of the performer in a wide, stable stance.
2. Place both arms behind the performer so that the far arm stretches across the small of the performer's back. Grasp the performer's far hip with your far arm while your near hand provides support in the small of the back.
3. Caution the performer to reach back with the arms overhead rather than flailing the arms to the side and possibly striking the spotter.
4. As the performer reaches backwards, gently lower the torso until the performer's hands touch the floor with straight arms and the shoulders are over or beyond the hands, thus providing adequate support.
5. Gently guide the hips forward in front of the performer's hips. Do not push too hard or the performer is likely to bend the knees and collapse.
6. As the performer attempts to return to the standing position, give additional gentle assistance by pushing forward and up as the hips move forward and up. Anticipate an attempt by the performer to rise by lifting the head first, resulting in the body piking and falling backwards abruptly.

Self-Analysis Questions

1. Did you initiate the movement with your fingertips instead of your head? ☐ Yes ☐ No
2. Did you move your hips forward to maintain balance while reaching backward? ☐ Yes ☐ No
3. Did you attempt to regain the upright position by moving your hips forward? ☐ Yes ☐ No
4. Did your arms remain extended overhead in line with the torso and shoulder, both when you reached back into the back bend and when you attempted to return to the upright, standing position? ☐ Yes ☐ No

Variations

This is a basic skill that is part of more advanced skills such as the front and back walkovers.

Forward Limber Over

(See Figure 17)

Prerequisites

1. Lunge to a handstand.
2. Must be able to support the upper body in a bridge position with straight arms and feet on the floor.

Progressions for Teaching

1. Step into a handstand from a lunge position.
2. Bridge forward with your shoulders as your hips and legs pass beyond the vertical.
3. As the feet contact the ground, push your hips forward and allow the stomach, chest, head, and arms to rise sequentially to the upright standing position.

Teaching Cues

1. Bridge the shoulders in the opposite direction from which you are moving.

2. The more you can bridge, the less arch you will need to place your feet on the floor.
3. Look at the floor between your hands as long as you can before attempting to stand.
4. To stand upright at the completion of the limber over, push the hips forward, lifting the head last.

Common Errors

1. Moving the shoulders in the same, instead of the opposite, direction as the limber over is moving.
2. Landing on bended knees, making it difficult to support your weight in a standing position.
3. Bending your arms after passing through the handstand.
4. Attempting to stand up by looking forward, dropping your chin on your chest and piking at the waist and reaching forward rather than up with the arms.

Potential Risks and/or Hazards

1. Arms bending after the handstand, causing you to collapse on the head and neck.
2. Excessive arch of the lower back, placing undue strain on the lower back.

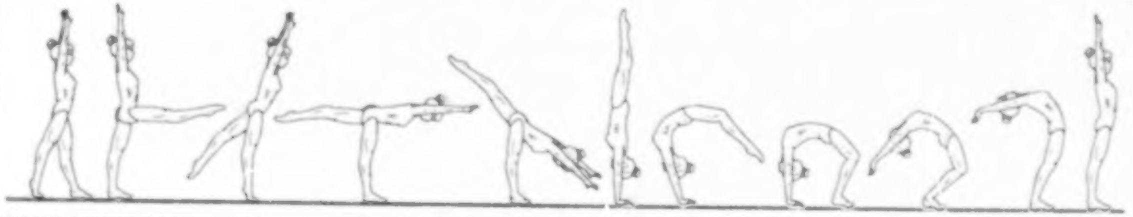
Appropriate Spotting Techniques

1. The spotter stands or kneels[3] to the side of the performer at approximately the spot where the performer's hands will contact the ground.
2. As the performer reaches the vertical position, reach across your body with the hand farthest away from the performer and grasp the performer's thigh. Your near hand moves to support the performer's lower back.
3. Use the hand on the performer's lower back to gently assist in moving the performer's hips forward and slightly up. Lifting too vertically and with too much pressure makes it difficult for performers to support their bodies on the mat and to learn to shift their hips forward in order to stand upright.
4. A more advanced method of spotting can be used for performers who have already demonstrated that they are capable of performing the skill safely with less physical assistance. This method involves placing the near hand on the performer's shoulder (thumb toward the shoulder, palm facing up) and gently guiding the shoulders back toward the direction from which they came (i.e., bridging the shoulders).

Self-Analysis Questions

1. Were your arms straight and held by your ears throughout? ☐ Yes ☐ No
2. Did you bridge ("reverse") your shoulders as you began the limber over? ☐ Yes ☐ No
3. Did you place your feet as close as possible to your hands? ☐ Yes ☐ No
4. Did you shift your hips forward in your attempt to stand upright? ☐ Yes ☐ No
5. Did you keep your head back until after you attained the upright position? ☐ Yes ☐ No
6. Did your arms remain extended overhead in line with the torso and shoulder as you rose to the upright, standing position? ☐ Yes ☐ No

Figure 17. Forward Limber Over



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[3] Kneeling often helps if the spotter is tall relative to the size of the performer. However, the spotter must be agile enough to move sideways if performers place their hands either far before the spotter or step far past the spotter. If the performers' hands are placed just before they reach the spot where the spotter is kneeling, the single skill can virtually never move beyond the grasp of a kneeling spotter. If the spotter prefers standing to increase the ability to move sideways, a lower position can be achieved by bending the knees or widening the spotter's stance. Beginning gymnasts will have bent knees.

Variations

This is a basic skill that is part of more advanced skills such as the front and back walkovers.

Front Walkover

(See Figure 18)

Prerequisites

1. Lunge to a handstand.
2. Must be able to support the upper body in a bridge position with straight arms and feet on the floor.
3. Ability to "reverse" (i.e., bridge) the shoulders while in a handstand.

Progressions for Teaching

1. From a standing position, step into a lunge with the arms extended over the head by the ears. Step forward onto the leg on which you do your best side split.
2. Bend forward at the waist while lifting the back leg and place the hands on the floor shoulder width apart as far away from the lunge foot as comfortable.
3. Push off the forward leg while continuing to lift the back leg.
4. As the body moves toward the vertical position, keep the legs in a wide split and begin to bridge the shoulder backwards in the direction opposite the direction the walkover is moving (just as described for the limber over).
5. If the bridge is successful, you should be able to keep your shoulders before your wrists until well after your first foot contacts the ground.
6. Your elbows should remain very straight throughout the entire skill.
7. Place your lead leg on the floor as close to your hands as possible, keeping the knee as straight as possible for maximum support.
8. Once your foot has contacted the ground, push your hips forward BEFORE attempting to stand upright until they pass beyond your foot.
9. Attempt to stand by sequentially lifting up through the stomach, chest, shoulders, and head and finally the arms and fingertips, keeping your head back until you feel the balanced, upright position with your hips over your feet.

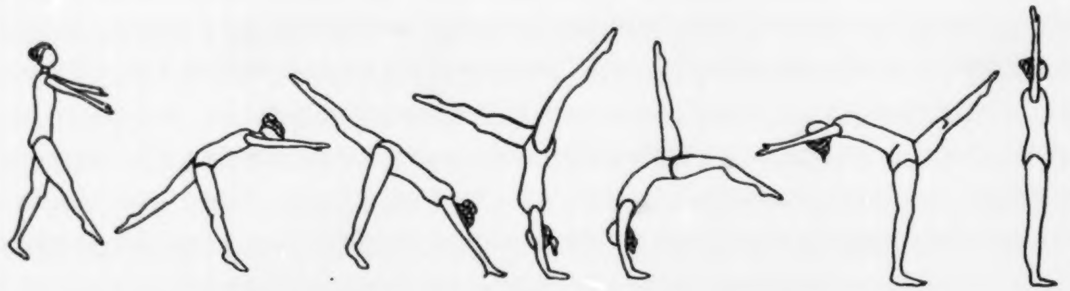
Teaching Cues

1. "Reverse the shoulders" as you reach the handstand position with your legs split.
2. Watch the ground between your hands as long as you can after you have passed through the handstand position.
3. Push your hips beyond your support leg before your hands leave the ground.
4. Lift your stomach, chest, and shoulders to the vertical BEFORE you look forward and lift your head.
5. Finish by stretching your hands to the ceiling, not forward of the upright position.

Common Errors

1. Failing to "reverse the shoulders."
2. Failing to push the hips forward beyond the support leg.
3. Attempting to stand to the vertical upright

Figure 18. Front Walk Over



position too soon (before the hips move beyond the support leg).

4. Ducking the chin to the chest in an attempt (usually too early) to stand up. This causes the body to pike, usually pushing the hips back behind the support leg and causing the performer to fall backwards.
5. Bending the arms during the support phase of the handstand.
6. Bringing the arms wide in an attempt to stand before a balanced support is achieved.

Potential Risks and/or Hazards

1. Bending the arms and collapsing onto the head and neck during the handstand phase.
2. Swinging the arms wide if the performer fails to achieve the support phase, often striking the spotter.
3. Trying to stand too soon, causing the body to pike and fall backward, often rather abruptly.

Appropriate Spotting Techniques

1. The spotting technique is the same as the technique used for the forward limber over.

Self-Analysis Questions

1. Did you start in a strong lunge position? ☐ Yes ☐ No
2. Were the hands placed as far in front of the lunge foot as possible to facilitate the handstand phase of the walkover? ☐ Yes ☐ No
3. Were your hands placed shoulder width apart? ☐ Yes ☐ No
4. Did the front leg push off as the hands made contact with the floor? ☐ Yes ☐ No
5. Did a bridging action take place; that is, did you "reverse" your shoulders? ☐ Yes ☐ No
6. Were your legs held in a wide split throughout the walkover? ☐ Yes ☐ No
7. Did the elbows remain straight throughout? ☐ Yes ☐ No
8. Did your lead foot land on the floor as close to your hands as possible? ☐ Yes ☐ No
9. Was the trailing leg held as high as possible upon landing? (Horizontal is ideal but very difficult to achieve.) ☐ Yes ☐ No
10. Did your head remain back until your weight was moved forward over your support leg? ☐ Yes ☐ No
11. Were your head and arms the last part of your body to reach the vertical, upright, standing position? ☐ Yes ☐ No

Variations

1. Front scale to a front walkover.
2. Front walkover to front walkover.
3. Front walkover to a split on the floor.
4. Front walkover to a cartwheel.
5. Front walkover to switch leg split, landing on the same leg as the lunge leg.
6. Tick-tock (after the front leg is placed on the floor, pause, reverse direction, and finish as in a back walkover).

Tinisca

(See Figure 19)

Prerequisites

1. The same prerequisites as required for the front walkover; however, this skill can be executed successfully with less flexibility than that required for the front walkover.

Progressions for Teaching

1. From a standing position, step into a lunge with the arms extended over the head by the ears. Step forward onto the leg on which you do your best side split.
2. Bend forward at the waist while lifting the back leg and place the hands on the floor shoulder width apart but staggered, with one ahead of the other as far away from the lunge foot as comfortable. The first hand down should be the hand on the same side of the body as the lead lunge leg. The fingers should be facing forward, and the shoulders should be on a diagonal line.
3. Push off the forward leg while continuing to lift the back leg.
4. As the body moves toward the vertical position, keep the legs in a wide split and begin to bridge the shoulder backwards in the direction opposite the direction the tinsica is moving.
5. Your elbows should remain very straight throughout the entire skill.

6. Place your lead leg on the floor as close to your second hand down as possible, keeping the knee as straight as possible for maximum support.
7. After your foot has contacted the ground but BEFORE attempting to stand upright, push your hips forward until they pass beyond your first foot down.
8. Attempt to stand by sequentially lifting up through the stomach, chest, shoulders, and head and finally the arms and fingertips, keeping your head back until you feel the balanced, upright position with your hips over your feet.

Teaching Cues

1. Place your hands and feet sequentially on the mat in an even 1-2-3-4 rhythm as with the cartwheel.
2. Hold your second hand out before placing it on the mat.
3. "Reverse the shoulders" as you reach the handstand position with your legs split.
4. Watch the ground between your hands as long as you can after you have passed through the handstand position.
5. Push your hips beyond your support leg before your hands leave the ground.
6. Lift your stomach, chest, and shoulders to the vertical BEFORE you look forward and lift your head.
7. Finish by stretching your hands to the ceiling, not forward of the upright position.

Common Errors

1. Placing the hands too close together, resulting in the tinsica not traveling down the mat.
2. Failing to "reverse the shoulders."
3. Failing to push the hips forward beyond the support leg.
4. Attempting to stand to the vertical position too soon (before the hips move beyond the support leg).
5. Ducking the chin to the chest in an attempt (usually too early) to stand up. This causes the body to pike, pushing the hips back behind the support leg and causing the performer to fall backward.
6. Bending the arms during the support phase of the handstand.
7. Bringing the arms wide in an attempt to stand before a balance support is achieved.

Potential Risks and/or Hazards

1. Bending the arms and collapsing onto the head and neck during the handstand phase.
2. Swinging the arms wide if the performer fails to achieve the support phase, often striking the spotter.
3. Trying to stand too soon, often causing the body to pike and fall backward, often rather abruptly.

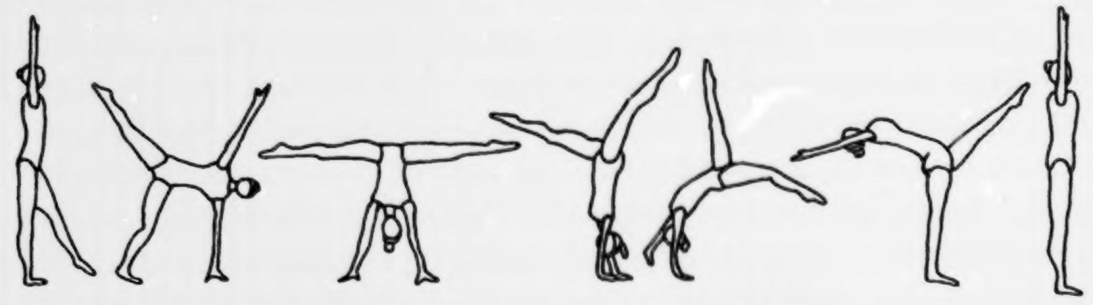
Appropriate Spotting Techniques

1. The spotting technique is the same as for the forward limber over and the forward walkover; however, the spotter should anticipate that the tinsica will travel further down the mat in the direction the skill is moving.

Self-Analysis Questions

1. Was the skill done with a four-count rhythm (hand, hand, foot, foot) as with the cartwheel?
☐ Yes ☐ No

Figure 19. Tinsica



2. Did you start in a good lunge position?
   ☐ Yes ☐ No
3. Were the hands shoulder width apart?
   ☐ Yes ☐ No
4. Did the front lunge leg push off the floor after the first hand made contact with the mat?
   ☐ Yes ☐ No
5. Did you execute a bridging action as you passed through the inverted, vertical position?
   ☐ Yes ☐ No
6. Did you hold a wide split throughout?
   ☐ Yes ☐ No
7. Did you keep your arms straight throughout?
   ☐ Yes ☐ No
8. Did you place your lead leg on the mat as close to your second hand as possible? ☐ Yes ☐ No
9. Was the trailing leg held as high as possible upon landing (Horizontal is ideal)? ☐ Yes ☐ No
10. Did you look at the floor between your hands for as long as possible and wait to lift your body to the upright position until after your weight pushed forward over your support leg?
    ☐ Yes ☐ No
11. Did you finish with your arms stretched high overhead in line with your straight back?
    ☐ Yes ☐ No

Variations

1. This skill can also be performed starting in a completely sideways position as described in the cartwheel. If so, at the vertical position, shift the hips to finish as with a forward walkover.
2. From a front scale.
3. To a front scale.

Back Walkover

(See Figure 20)

Prerequisites

1. Ability to perform a handstand.
2. Must be able to support the upper body in a bridge position with straight arms and feet on the floor.
3. Ability to "reverse" (i.e., bridge) the shoulders while in a handstand.

Progressions for Teaching

1. From a standing position, with your arms stretched overhead, lift one leg high off the floor, ideally to horizontal or above. Keep the support leg straight and the back flat without an arch or sag.
2. Arch backward, leading with the fingertips, not the head.
3. Keep the hips over the support leg.
4. Your hands should contact the floor approximately shoulder width apart as close to the support leg as possible.
5. As the hands contact the floor, bridge the shoulders over your hands.
6. As you pass through the inverted, vertical position, straighten your back and maintain a wide split.
7. After passing through the vertical position, place your lead foot on the mat approximately 1-2 feet from your hands.
8. Push off the floor and extend the arms overhead by your ears while stepping back into a lunge position to finish.

Teaching Cues

1. As you begin to arch backward, attempt to lift your lead leg up toward the ceiling.
2. As you begin to arch backwards, feel as though you are reaching up and back with your fingertips and arms rather than straight back and down to the floor.
3. Without bending your support leg, move your hips (i.e., your balance point) slightly forward over the support leg.
4. Keep your head neutral and look "through your eyebrows" toward your extended fingertips to see the floor at a point between where your hands will land.
5. In the support phase, straighten your back to feel strong and supported by your arms.
6. As your first leg passes the vertical and drops to the floor, tighten your buttocks and attempt to hold a straight line from your shoulders through your hips to the tips of the toes of your second leg. (This technique allows the leg to counterbalance the head and chest and allows the body to rise into the extended lunge position much more easily).
7. Push off the floor to facilitate the lifting of the arms. Attempting to lift without pushing makes the arms feel heavy.

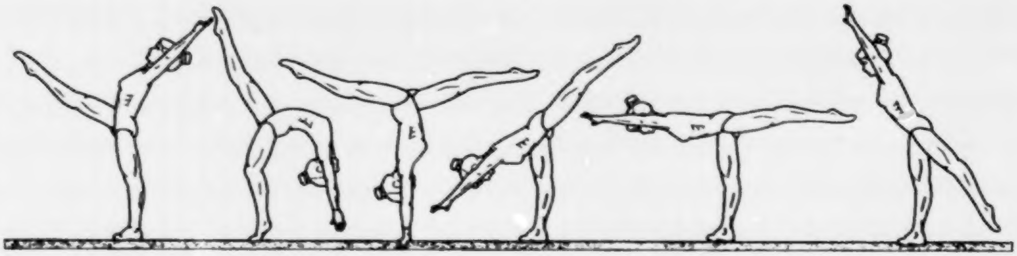


Figure 20. Back Walkover

Common Errors

1. Dropping the lead leg as the head and shoulder reach backward to begin the back walkover.
2. Looking back with the head before reaching up and back with the fingertips and arms.
3. Bending the support leg as you reach back, causing a loss of support and the sensation of falling out of control.
4. Ducking the head as your hands approach the mat, preventing you from seeing the landing.
5. Failing to bridge after the hands land on the mat, often resulting in a planching at the shoulder and causing the back walkover to collapse from the handstand position.
6. Dropping the back leg as you attempt to rise to a standing position, resulting in your chest dropping toward the floor.

Potential Risks and/or Hazards

1. Allowing the balance point to move beyond the support leg as you reach back, causing you to fall heavily on your hands.
2. Bending the arms at the support phase, causing you to fall.
3. Reaching backward with the arms wide, striking the spotter on the way back and preventing at least one arm from reaching the support position.
4. Planching on the descent phase, causing you to fall to the head and neck.
5. Excessive arching causing lower back stress, especially with multiple repetitions.

Appropriate Spotting Techniques

1. Stand to the side of the performer, facing the performer's shoulder on the side with the leg the performer intends to lift.
2. With your far arm, reach across the small of the performer's back and grasp the performer's waist.
3. With your near arm, support the thigh of the performer's lifting leg.
4. As the performer arches and reaches backward with the hands, support the lower back, allowing the hands to gently land on the mat.

Self-Analysis Questions

1. Was the body stretched throughout the skill? ☐ Yes ☐ No
2. Did you try to reach up and back as you began the skill? ☐ Yes ☐ No
3. Was the lead leg (i.e., the lifting leg) kept straight throughout? ☐ Yes ☐ No
4. Did you bridge your shoulders after your hands made contact with the mat? ☐ Yes ☐ No
5. Was your head held neutral throughout, neither ducking the chin to the chest nor looking backwards before the reach of the arms? ☐ Yes ☐ No
6. Did the hips move forward slightly to maintain the balance point over the support leg as the chest, head, and arms moved back together? ☐ Yes ☐ No
7. Did you keep your back leg extended in line with the body as you pushed off the floor, helping the arms and chest to rise to the standing position? ☐ Yes ☐ No

Variations

1. Back walkover to front scale.
2. Back walkover to a kneeling pose.
3. Switch leg back walkover.
4. Back walkover from a sitting position (valdez).

Valdez

(See Figure 21)

Prerequisites

1. The ability to perform a back walkover from a standing position.

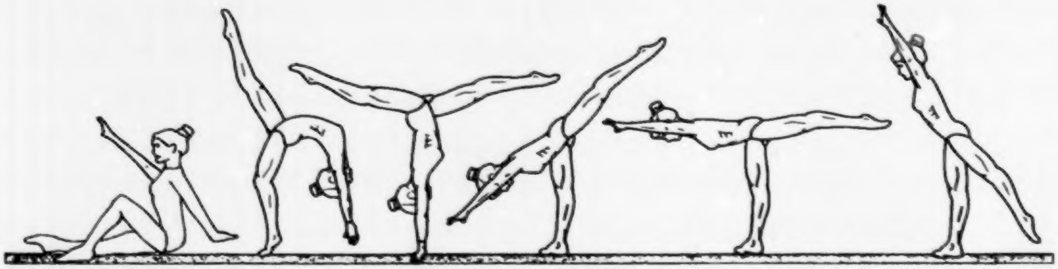
Progressions for Teaching

1. Start from a sitting position with the eventual support leg bent and the hand on the same side as the support leg placed behind the buttocks, with the fingers pointing away from the body.
2. Reach up as high as possible, extending the support leg as straight as possible and as quickly as possible before reaching backwards into the bridging position.
3. As the second hand is placed on the mat about shoulder width apart from the support hand, bridge the shoulders over the hands.[4]
4. As your hands contact the floor, bridge your shoulders over your hands.
5. As you pass through the inverted, vertical position, straighten your back and maintain a wide split.
6. After passing through the vertical position, place your lead foot on the mat approximately 1-2 feet from your hands.
7. Push off the floor and extend the arms overhead by your ears while stepping back into a lunge position to finish.

Teaching Cues

1. Push on the heel of your hand so your hand can swivel on the ground, resulting in the fingers—which were initially pointing away from the body—now finishing pointed back in the direction the skill started.
2. Dramatically emphasize reaching up and pushing up before reaching backwards into the walkover position.
3. Lift the chest up into the highest position possible while fully extending the support leg.
4. Keep your head neutral and look "through your eyebrows" towards your extended fingertips to see the floor at a point between where your hands will land.
5. In the support phase, straighten your back to feel strong and supported by your arms.
6. As your first leg passes the vertical and drops to the floor, tighten your buttocks and attempt to hold a straight line from your shoulders through your hips to the tips of the toes of your second leg. (This technique allows the leg to counterbalance the head and chest and allows the body to rise into the extended lunge position much more easily).
7. Push off the floor to facilitate the lifting of the arms. Attempting to lift without pushing makes the arms feel heavy.

Figure 21. Valdez



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[4] An excellent drill for the valdez is to practice this lift into the bridge without attempting to kick over into the valdez. The focus of the drill is to totally extend the support leg, pushing the hips and upper high enough to allow the arms to finish in the bridge position without bending and with the shoulders bridged beyond the base of support (i.e., the hands).

Common Errors

1. Starting with the hand opposite the bent leg on the ground.
2. Throwing your head backwards into the walkover before straightening the support leg.
3. Ducking the head as your hands approach the mat, preventing you from seeing the landing.
4. Failing to bridge after the second hand is placed on the mat, often resulting in a planching at the shoulder and causing the skill to collapse from the handstand position.
5. Dropping the back leg as you attempt to rise to a standing position, resulting in your chest dropping toward the floor.

Potential Risks and/or Hazards

1. Collapsing on the head and neck because of arching or throwing the head and upper chest backwards before the support leg has pushed the body high enough for the second support hand to contact the mat with the elbow fully extended.

Appropriate Spotting Techniques

1. The spotting technique is the same as with the back walkover, although the spotter must anticipate that the performer's body will start in a lower position so the spotter must start from a one-legged kneeling position.

Self-Analysis Questions

1. Did you start with the correct support hand (same side as your initially bent support leg)? ☐ Yes ☐ No
2. Did you reach as high as possible and fully extend the support leg before arching backwards into the walkover? ☐ Yes ☐ No
3. Did you bridge your shoulders after your second hand made contact with the mat? ☐ Yes ☐ No
4. Was your head held neutral throughout, neither ducking the chin to the chest nor looking backwards before the reach of the arms? ☐ Yes ☐ No
5. Did the hips move forward slightly to maintain the balance point over the support leg as the chest, head, and arms moved back together? ☐ Yes ☐ No
6. Did you keep your back leg extended in line with the body as you pushed off the floor, helping the arms and chest to rise to the standing position? ☐ Yes ☐ No

Variations

1. Switch leg valdez.

Kip-Up

(See Figure 22)

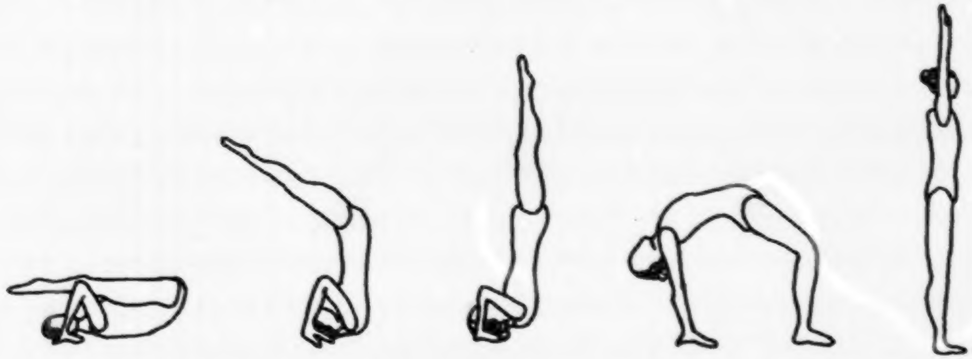
Prerequisites

1. Ability to support the body weight during a bridge.

Progressions for Teaching

1. Start on the mat on your back, with your arms bent overhead and your palms flat on the ground by your head, thumbs closest to your ears.

Figure 22. Kip-Up



2. Keeping your legs straight, lift them over your body so that your knees approach your face in a piked position.
3. Rapidly drive your legs up to the ceiling by tightening your back muscles and extending your hips.
4. Simultaneously, vigorously straighten the arms, pushing the head, shoulders, and chest off the ground.
5. The legs continue through an arc and land on the ground underneath the hips, thus passing through a bridge position. (Kipping to a stationary bridge is an excellent lead-up progression to the Kip-Up).
6. If the leg drive and the arm push are vigorous enough and in the proper direction, your momentum should allow you to rise to a stand. You must focus on moving your hips forward so that they arrive above your feet rather than attempting to reach forward with your hands and/or ducking your head forward on your chest.
7. As your arms are extended over your head, keep them by your ears and aligned with your torso and shoulders as your arrive in the standing position.

Teaching Cues

1. Drive the legs up as high as your can before allowing them to descend to the floor.
2. Time the vigorous push with the arms and extension with the legs so they occur together.
3. Move the hips over the feet before attempting to stand.
4. Keep the head back in the neutral position as long as possible.
5. Keep the arms extended overhead by the ears in line with the torso and the shoulders.

Common Errors

1. Attempting to stand too early.
2. Driving the legs forward rather than up, resulting in the hips being too low to allow the legs to arrive under the hips with minimal bending of the knees, an action that is essential for you to be able to stand.
3. Ducking the chin forward on the chest in an attempt to see forward and to stand.
4. Straddling the legs too widely in an attempt to stand up.
5. Incomplete extension of the arms, resulting in insufficient force to allow you to stand.

Potential Risks and/or Hazards

1. Failing to extend the arms sufficiently on the push from the floor, often resulting in performers falling to their back.

Appropriate Spotting Techniques

1. Stand to the side of the performer and face the performer's hips.
2. Place your near hand under the performer's shoulder and the other under the small of the performer's back.
3. As the performer extends the legs and pushes the body off the floor, provide a gentle but firm support that shifts the performer's weight up and forward over the performer's hips.
4. Anticipate attempts by the performer to stand too early, resulting in a sudden falling backwards.

Self-Analysis Questions

1. Did you drive the legs and extend the arms vigorously and simultaneously? ☐ Yes ☐ No
2. Did you pass through the bridge position before attempting to stand? ☐ Yes ☐ No
3. Did your hips move forward to a position above your feet before trying to stand? ☐ Yes ☐ No
4. Did you keep your head neutral for as long as possible? ☐ Yes ☐ No
5. Did your arms remain extended overhead by your ears in line with your torso and shoulders? ☐ Yes ☐ No

Variations

1. Kip-up from a headstand.
2. Forward roll to a headstand to a kip-up.

Front Handspring

(See Figure 23)

Prerequisites

1. Ability to support the body weight during a handstand.

Progressions for Teaching

1. From a standing position, take one to three running steps to a lunge, with the knee ahead

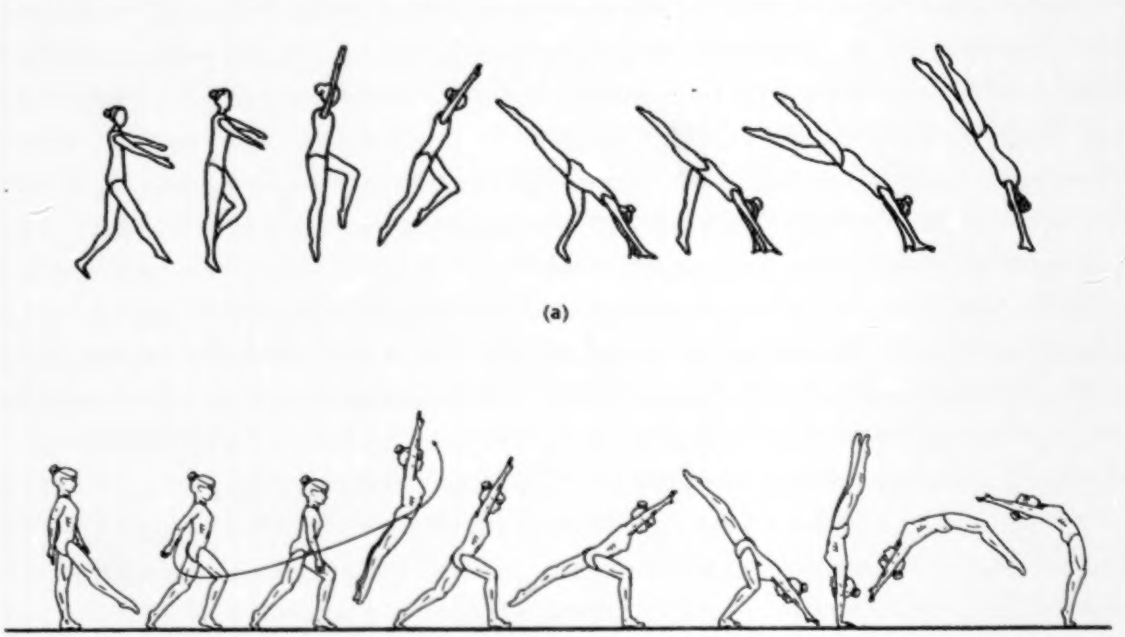
of the foot (as in the round-off).

2. Bring the hands to the floor as quickly as possible without breaking the shoulder angle and with the back in a hollow position (shoulder blades spread, stomach in). Thus, the chest must be driven forward toward the thigh of the lunge leg.
3. The hands must contact the floor before the lunge leg straightens.
4. As your hands contact the floor, you should push FORWARD while vigorously extending the lunge leg and simultaneously forcefully driving the back leg straight overhead.
5. Your legs should come together by the time they hit the vertical position if you are attempting a two-foot landing. If you are attempting to land on one foot, you should feel almost a stopping action of the first leg as the vertical position is attained (so that momentum is transferred to the torso).[5]
6. Land with the foot or feet under the hips for support.
7. The arms should finish stretched up toward the ceiling and aligned with the ears.
8. The head should remain back until the support phase is achieved.

Teaching Cues

1. The run should be forceful but no more than one to three steps.
2. Drive with the chest, not just the arms.
3. Block with the arms stretched in line with the shoulders.
4. Push early and forward. This push should be FORWARD, not down, so that a blocking action occurs, facilitating the flight phase (i.e., the spring).
5. The push-off from the hands should occur forcefully BEFORE the body attains the vertical position so that a flight phase is attained.

Figure 23. Handspring
(a) Front Handspring Using American Hurdle, (b) Front Handspring Using European Hurdle



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[5] To avoid excess pressure on the lower back upon landing, the beginner gymnast is advised to attempt the one-foot landing or land on a relatively soft mat (e.g., 8" mat) with the assistance of a spotter who supports the lower back and softens the landing.

6. Keep the head neutral during the flight phase. Do not duck the chin.
7. Keep the back straight on the landing and land with flexed knees to absorb the force.

Common Errors

1. Reaching down to the floor with the arms by planching at the shoulders.
2. Placing the hands too close to the lunge foot.
3. Straightening the lunge leg before the hands contact the floor, causing a diving action that slows the rotation and minimizes the push-off from the hands necessary for the "springing" action of the handspring.
4. Failing to drive the back leg vigorously toward the ceiling.
5. Arching the back too much.
6. Landing with the lower back excessively arched.
7. Pushing in the wrong direction with the arms (i.e., pushing down instead of blocking by pushing forward into the mat as the handspring is initiated).
8. Ducking the chin during the flight phase, which causes the body to pike and often fall backwards upon landing.
9. Flexing the landing leg too much to provide sufficient support to stand.
10. Arching the back and failing to block with the arms, resulting in a "fast front walkover" rather than a springing action.

Potential Risks and/or Hazards

1. Landing on an excessively arched back.
2. Landing on an excessively bent leg, causing it to fold under the body upon landing.
3. "Stiffing" elbows during the push-off the floor (part of the impact should be absorbed in the shoulders).
4. Landing on straight legs and hurting the knees.

Appropriate Spotting Techniques

1. The spotting technique is virtually the same as for the front limber over and front walkover but at a much faster speed. The spotter should anticipate that the landing will travel further beyond the point at which the performer's hands contact the mat than with the front walkover or front limber over. Thus, kneeling is not an option for the spotter as it is with the slower skills.
2. With more advanced performers, and after safe landings have been demonstrated consistently by the performer, the spotter can "block" the performer's shoulder by gently but firmly pushing on the performer's shoulders in the opposite direction than the performer is traveling at the point of impact with the floor. Such a push, properly executed, tends to pop the performer in the air, facilitating the "spring" in the handspring and helping the performer experience the proper blocking action. The spotter should be prepared for the possibility of the performer over-rotating with such a spot and quickly shift the hand furthest from the performer away from the performer's back and to the performer's stomach to control any possible over-rotation.

Self-Analysis Questions

1. Did you start in a strong but controlled lunge position? ☐ Yes ☐ No
2. Did the hands come to the floor quickly without breaking the shoulder angle? ☐ Yes ☐ No
3. Did the hands come to the floor quickly with the back held in a hollow position? ☐ Yes ☐ No
4. Did the hands come to the floor quickly before the forward leg straightened to push for the front handspring? ☐ Yes ☐ No
5. Did the back leg drive upward forcefully to the vertical? ☐ Yes ☐ No
6. Did the legs join together before either reached the vertical position? ☐ Yes ☐ No
7. Did your push-off occur before the vertical position was attained? ☐ Yes ☐ No
8. Did the arms remain stretched alongside the head throughout? ☐ Yes ☐ No
9. Did the head remain back until the landing? ☐ Yes ☐ No
10. Was there a flight phase (time when both the hands and feet were off the ground?) ☐ Yes ☐ No
11. Did the knees flex slightly to absorb the force of landing, yet allow you to stand? ☐ Yes ☐ No

Variations

1. Handspring walkout.
2. Front handspring, switch leg.

Back Handspring

(See Figure 24)

Prerequisites

1. Ability to support the body weight in a handstand.

Progressions for Teaching

1. Start from an upright stand with the arms at the sides and fall backwards about 10 degrees while maintaining a straight body position.
2. After the fall has been initiated, quickly bend your knees slightly and drive the arms upwards and backwards while extending your knees (i.e., a quick, not a deep, jump).
3. Contact the floor with your hands, shoulder width apart, with the torso and the legs just short of vertical and the shoulders bridged slightly beyond the hands.
4. From a slight, tight arch, with the shoulder blades pinched, move quickly into a hollow body position with the stomach sucked in and the shoulder blades extended to a very broad position.
5. While moving to the hollow body position, snap the legs down to the floor in one of two different positions, depending on the skill you wish to perform next.
    a. Blocking Under – If you wish to perform a second back handspring, the legs snap down, landing as close to your hands as possible, resulting in a position that allows to you fall back immediately into the second back handspring.
    b. Blocking Out – If you wish to stop in a standing position, rebound into a leap or initiate a back somersault, snapping your legs down to a position beyond the vertical as far away from your hands as possible.
6. Push off the floor with your arms so that you land in either the blocked in or the blocked out position, with the arms overhead and aligned with the back and the shoulders.
7. Rebound to a standing position.

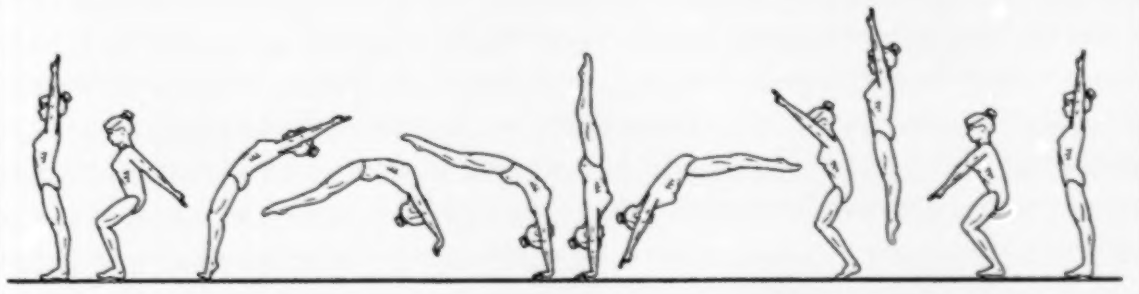
Teaching Cues

1. The verbal cues for the timing used to start the back handspring are "Fall... sit, go."
2. Jump quickly as opposed to from a slow deep knee bend. (The verbal cues for the energy are "Quick and hard.")
3. The verbal cues for the snap down are "Arch – Hollow."
4. The back handspring should travel approximately $1\frac{1}{2}$ to 2 body lengths. (The verbal cues are "Long and low.")
5. Anticipate the ground by pushing early in anticipation of the body's impact on the mat.
6. See the floor between your hands without raising your head or arching excessively.
7. Rebound by "punching"[6] the mat rather than landing in a deep knee bend.

Common Errors

1. Dropping the chest forward before initiating the arm throw, resulting in the hips moving forward

Figure 24. Back Handspring



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[6] Punching refers to straightening the knees from a slight tight knee flexion just as the feet contact the ground as opposed to landing in a deep knee bend and then trying to jump. Punching provides quickness to the jump and helps prevent the knees from buckling under the force of the landing.

rather than backwards. If this happens, the back handspring stays in the same spot or moves forward rather than traveling backwards, an action referred to as "undercutting." Undercutting creates a weak support position while in the inverted, vertical position and reduces the horizontal momentum required to execute a series of back handsprings to a back somersault.

2. Failing to jump the legs to the inverted, vertical position with sufficient energy, causing the performer to land on the hands too far short of vertical, often resulting in a second error of planching the shoulders.
3. Planching the shoulders, causing a loss of support in the inverted handstand phase of the skill.
4. Throwing the head back before the arms, resulting in excessive arch and causing the arms to arrive late to the support position in the inverted handstand position.
5. Placing the arms wide, with the fingers pointing to the side rather than pointing back in the direction from which the performer has come, preventing an effective push to a standing position.
6. Pushing in the wrong direction with the hands while in the inverted handstand position, resulting in the arms dropping to the thighs rather than remaining overhead.
7. Landing in a deep knee bend rather than rebounding with a quick punching action of the legs.

Potential Risks and/or Hazards

1. Collapsing on the head and neck while in the inverted handstand position, often from landing on bent arms, from excessive arching, or from planching at the shoulders.
2. Straining the wrists and the back by under-rotating as you jump to the back handspring.
3. Throwing the hands wide as you begin the back handspring instead of keeping the arms narrowly aligned, resulting in the performer striking the spotter in the face.

Appropriate Spotting Techniques

1. Stand or kneel to the side and slightly behind the performer, facing the performer's shoulder.
2. Place the far hand on the performer's lower back at the top of the hips.
3. Place the near hand under the performer's nearest thigh.
4. As the performer begins the skill, lift the thigh while allowing the head, chest, and back to rotate backwards and gently providing support to reduce the impact on the mat.
5. Be certain the performer's thigh (and thus the body) are high enough off the ground to allow the arms to contact the ground in a straight, extended position with the shoulders above the hands.
6. As the performer progresses to executing the back handspring vigorously, quickly move your far hand to support the upper back at the end of the back handspring in the vertical position to guard against over-rotation and falling to the back.

Self-Analysis Questions

1. Did your body lean backward behind the feet rather than arch from the hips? ☐ Yes ☐ No
2. Did the chest and knees stay behind the base of support (i.e., the ankles and feet) during the initial falling phase? ☐ Yes ☐ No
3. Was the jump quick and rapid as opposed to deep and slow? ☐ Yes ☐ No
4. Did you jump to the inverted, vertical position as quickly and powerfully as possible? ☐ Yes ☐ No
5. When the hands contacted the mat, were the shoulders over the hands? ☐ Yes ☐ No
6. When the hands contacted the mat, were the legs almost at the vertical position? ☐ Yes ☐ No
7. When the hands contacted the mat, were you able to see the mat without pulling the head back excessively? ☐ Yes ☐ No
8. Did your hands land on the mat about shoulder width apart? ☐ Yes ☐ No
9. During the snap-down, did the body move from a slight, tight arch to a "hollow" position? ☐ Yes ☐ No
10. Did your arms push off the floor so that you arrived in either the blocked in or blocked out position, with the arms extended overhead? ☐ Yes ☐ No

Variations

1. A series of two or more back handsprings.
2. Back handspring step-out (one leg lands first and the performer steps back in a lunge position with the second leg).

3. Round-off, back handspring. (Remember to block in!)
4. Round-off, back somersault. (Remember to block out!)

Back Somersault

(See Figure 25)

Prerequisites

1. Experience (i.e., body awareness) with rotating upside down (e.g., backwards rolls, back walkovers, back handsprings).
2. Sufficient leg strength to absorb the shock of the landing.

Progressions for Teaching

1. From a stand, with the arms down along the side of the body, often on an elevated mat and with a soft mat for the landing.
2. Bend the knees slightly and jump quickly.
3. Drive the arms vigorously over the head, arriving at the vertical position before the feet leave the ground.
4. Keep the head neutral as the arms "lock" at the vertical position.
5. As the momentum shifts from the arms to the torso, drive the knees over the shoulders with a slight lead of the toes.
6. As the body rotates, look for the landing spot on the floor without pulling the head out of the neutral position.
7. Land on the floor with legs slightly flexed but muscles tightened to soften the landing.

Teaching Cues

1. Drive the hands overhead and "lock" them by the ears.
2. Look forward to compress the tuck position and decrease the sensation of rotating.
3. Try to land on the same spot you take off from.

Common Errors

1. Dropping the chest forward in the "wind-up" phase, resulting in an undercutting motion.
2. Throwing the head backwards before the arms rise to the vertical, causing an open tuck that whips backwards and rotates slowly because of the open position.

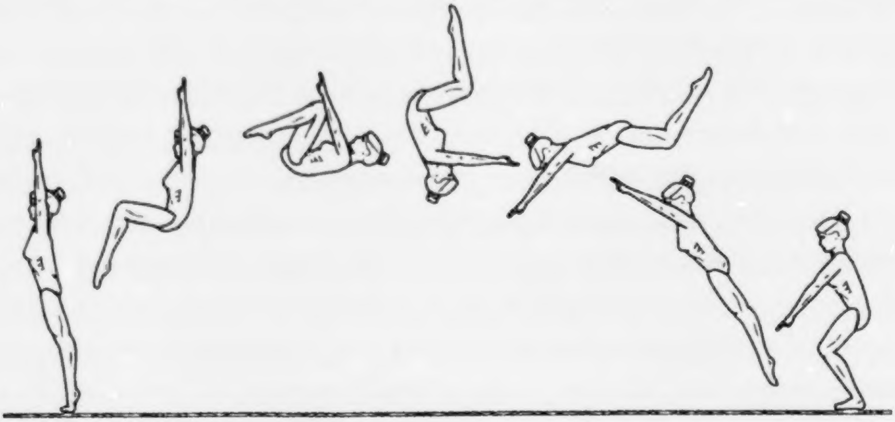
Potential Risks and/or Hazards

1. Slow rotation on the somersault, resulting in failure to complete the rotation and falling on the head and neck.
2. Sticking the legs out straight when opening the tuck, landing on straight knees and possibly jamming the knees.

Appropriate Spotting Techniques

1. Stand to the side, slightly behind the performer and facing the performer's shoulder.
2. Place your far hand on the small of the back (too high a placement often makes the performer feel as thought the backwards rotation will be stopped by the spotter's hand).
3. Place your near hand on the back of the thigh, thumb down, and with your palm facing the thigh.

Figure 25. Back Somersault



4. As the performer starts the rotation, lift sufficiently vigorously on the thigh to aid the rotation without throwing the performer.
5. As the performer lands on the ground, place your far hand again on the small of the back or slightly higher to prevent the possibility of over-rotation.

Self-Analysis Questions

1. Did you drive the chest upward rather than dropping the chest and driving it backwards?
   ☐ Yes ☐ No
2. Did the arms arrive in the extended position over the head before the feet left the ground?
   ☐ Yes ☐ No
3. Was the tuck tight as opposed to an open and arched back? ☐ Yes ☐ No
4. Did the legs lift with positive toe lead (in front of your knees) rather than with the heels being drawn backwards towards the buttocks?
   ☐ Yes ☐ No
5. Did you spot the ground just before landing?
   ☐ Yes ☐ No
6. Was your head held neutral throughout the back somersault? ☐ Yes ☐ No
7. Did your legs flex slightly but firmly to soften the landing? ☐ Yes ☐ No

Variations

1. Round-off, block out, back somersault, tucked position.
2. Round-off, block in, back handspring, block out, back somersault, tucked position.
3. Round-off, block in, back handspring, block out, back somersault, piked position.
4. Round-off, block in, back handspring, block out, back somersault, straight position (layout).

Side Aerial

(See Figure 26)

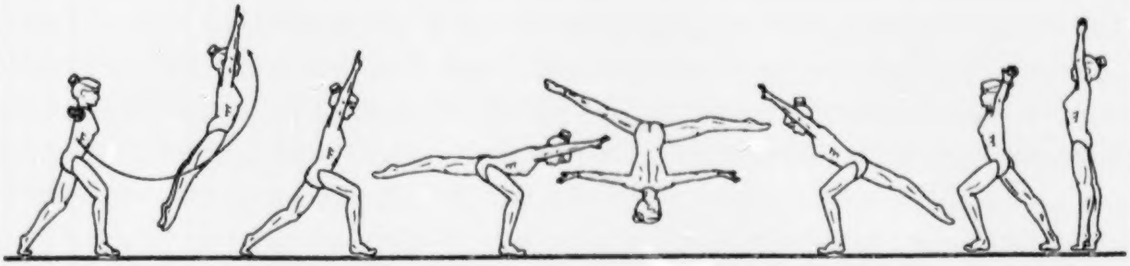
Prerequisites

1. Ability to support the weight in a handstand.
2. Ability to perform a lunge from a short run (one to three steps).
3. A far-arm cartwheel is helpful but not absolutely essential.

Progressions for Teaching

1. From a short run (one to three steps), lunge with the foot and ankle in front of the knee, with the arms overhead.
2. Drive the chest toward the thigh of the lunge leg while looking directly at a spot a few inches in front of the toes of the lunge leg.
3. Drive the back leg as vigorously as possible to the vertical position.
4. Simultaneously, throw the arms vigorously from their extended position over the head through an arch that ends at the hips.
5. Tighten the arms to stop suddenly as they reach the hips; simultaneously tighten the buttocks as the back leg reaches the vertical or as high as possible.
6. Vigorously extend the lunge leg, driving the hips up AND BACK.
7. Watch the floor throughout the entire skill.
8. As the legs hit the vertical, continue to watch the floor, allowing the hips to pirouette.

Figure 26. Side Aerial



9. After the pirouette, land in a lunge on the same leg that drove to the ceiling.
10. Keep the buttocks tight as the second leg drops to the floor to allow the head and chest to rise to the vertical, upright position.
11. Finish with the arms extended high overhead in line with the torso and the head.

Teaching Cues

1. Run fast but with no more than one to three steps.
2. Try to jump BACKWARDS from the foot of the lunge leg (i.e., block out with the lead leg). Perform the aerial by trying to land in the same spot on the floor that you took off from.
3. Always look straight down at the floor; never look to the side.
4. "Lock" the arms and the back leg as the lunge leg blocks.
5. Land in a lunge to soften the landing.
6. Clarify that an aerial that starts with a left leg lunge twists the right shoulder back; a right leg lunge aerial twists the left shoulder back.
7. Try to start and finish on a straight line, often using a tape or chalk line on the floor for feedback.
8. After the first leg lands (toes pointing back in the direction from which the performer started), tighten the buttocks and hold the back leg extended so it can help the head and chest rise and so you can place that leg on a straight line in the same direction the aerial originally started.

Common Errors

1. Running too far in a vain attempt to perform the aerial.
2. Thinking the aerial turns towards the direction of the lunge leg and looking to the side of the lunge leg while attempting to twist. This produces rotation around the belly button rather than around the length of the body, causing the aerial to move to the side rather staying on a straight line.
3. Turning the head sideways and losing sight of the spot on the mat in front of the lunge leg.

Potential Risks and/or Hazards

1. Failing to pirouette sufficiently and landing on the side of the foot rather than the sole of the foot.
2. Landing on a straight arm if the aerial fails to rotate fast enough to complete the aerial before the feet land on the mat.

Appropriate Spotting Techniques

1. Stand on the same side of the performer as the performer's lead lunge leg at the point where the lead lung foot contacts the mat.
2. Place one or two hands (depending on your strength relative to the size and weight of the performer) on the hip of the performer's lunge leg.
3. Block the hip, pushing gently but firmly back against the direction of the run.
4. As the performer rotates and drops toward the landing on the mat, quickly shift your far hand to the back of the hips to prevent over-rotation.
5. Anticipate under- or over-rotation, potentially landing in a split, by providing gentle but firm support on the hips.

Self-Analysis Questions

1. Was the run dynamic but limited to one to three steps? ☐ Yes ☐ No
2. Did you block with the lunge leg (that is, did you try to jump backward while stepping forward)? ☐ Yes ☐ No
3. Did you watch the floor just in front of your lunge leg throughout the skill? ☐ Yes ☐ No
4. Do you understand correctly which way your shoulders are actually pirouetting (left lunge, right shoulder back pirouette; or right lunge, left shoulder back pirouette)? ☐ Yes ☐ No
5. Did you "lock" your drive leg and your arms at the same time as you blocked the floor with your lunge leg? ☐ Yes ☐ No
6. Did you finish with your arms extended high overhead and aligned with the torso and the head? ☐ Yes ☐ No
7. Were you able to stay on a straight line from the take-off to the landing? ☐ Yes ☐ No

Variations

1. Side aerial to a back roll.
2. Side aerial to a back walkover.
3. Side aerial to a back handspring.
4. Under arm side aerial.

Round-Off, Back Handspring, Back Somersault, Tucked Position

(See Figure 27)

This last illustration demonstrates how multiple skills can be linked together. Each part of the sequence has been analyzed in earlier sections. Note from the illustration how the legs are "blocked in" after the round-off to facilitate the back handspring and how they are "blocked out" after the back handspring to facilitate the back somersault.

Practice for Improvement

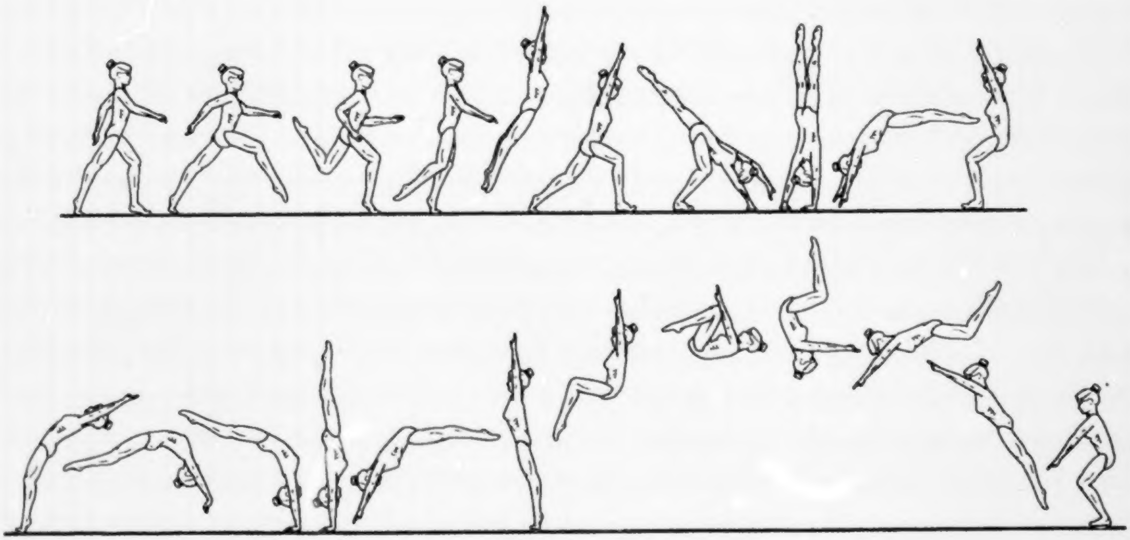
In gymnastics, in general, and in tumbling, specifically, after individual skills have been learned, they are typically performed in combination with other skills. Many skills provide the speed, direction, and momentum that assist the second, third, fourth skill in the sequence. The back handspring is much easier to perform from a well-executed round-off or another back handspring than from a stationary, standing position. On the other hand, a poorly executed round-off may well make the back handspring harder or scarier if the round-off is too slow or crooked, for example. Once your skills have been mastered reasonably well and safely, make it a point to practice them in combinations rather than as isolated, single skills. For competition, a routine of slightly more than a minute must be completed.

Make it a point to practice with good form (i.e., straight legs, cleanly aligned body positions, and pointed toes). Skills that are performed sloppily use different biomechanics; re-learning them later with good form is often like learning a brand new skill.

Safety Concerns

Safety is first and foremost an attitude. Although many students are attracted to tumbling and gymnastics because of the excitement and stimulation of experiencing new ways of moving through space, proper precautions are essential for safety. Proper caution requires awareness of three things. First, you must be aware of the possible outcome of an activity,

Figure 27. Round-Off, Back Handspring, Back Somersault, Tucked Position



i.e., know the risk. Second, you must be aware of those procedures that can be used to eliminate any negative outcomes associated with the activity, i.e., what controls the risk. Third, you must be alert and practice safe procedures, i.e., appreciate the risk. A major contributor to safety is knowing your limitations and working within those levels. Safe performers are aware of their strength, flexibility, and cardiovascular levels and, while they work to improve those levels, they remain within them as they attempt specific tumbling skills.

Specific safety concerns for each skill have been addressed under the risks and hazards, common errors, and spotting sections; however, there are a number of safety concerns that each student must know. First, every student should master the basic falling techniques described below. Mats and spotters, while essential, are not sufficient to guarantee safety.

Falling

Falling is a given in gymnastics. Not only is it inevitable, it is a skill that can be learned and improved. There are elementary falls, intermediate falls, and advanced falls. Learning to fall safely involves using progressions that start with a prepared, low fall involving little energy so that if mistakes are made, there is little risk of injury or pain. The general strategy of safe falling is to spread the force of the landing across the greatest possible distance, time, and area of the body. Short, quick, localized impacts are the most likely to cause injury.

To start, beginner gymnasts should master falling forward, falling backward, and falling sideways. All falls should start low to the ground to minimize the impact of falling, and further energy should not be added until the student has mastered the falling technique safely. Once the falling techniques have been mastered, the instructor should always reinforce proper techniques of falling. Because falling is often sudden and unexpected, the skills of falling should be habits that are as automatic as possible. If the instructor sees a student perform a fall incorrectly during the instruction of other skills, the student should be reminded of the correct technique immediately.

Forward Falling

Please see illustrations in the Self Defense chapter of this book.

Step one – Start in a push-up position on your knees on a soft mat (e.g., 4" or 8" landing mat). Lower your torso to a landing that maintains support on the palm of the hands and the chest. The face should be turned to the side to protect the nose and face.

Step two – From the push-up position, repel from the floor and, as you fall back to the floor, land with your elbows bent, turning your head to the side and landing on the chest while breaking the fall with your bent arms.

Step three – Repeat the previous drill from a vertical starting position on your knees. Fall forward and repeat step two.

Step four – Start from a standing position, drop to the knees, and repeat step three. Repeat several times, adding force and momentum as your control increases.

Step five – From a slightly raised platform such as a folded panel mat, fall from a standing position onto the soft mat, absorbing the impact with bent arms and landing on the thighs and chest to distribute the energy safely.

Step six – Repeat step five with a slight jump instead of from a stand to add more energy to the fall after mastery has been demonstrated on the falls with less energy and less impact.

Backward Falling

Please see illustrations in the Self Defense chapter of this book.

Step one – On a soft mat (e.g., 4" or 8" landing mat), lying on your back, round your back and shoulders; bend your knees, bringing them up to your chin on your chest; and rock backwards and forward to experience maintaining a rounded back while moving. The neck and shoulder muscles should be tightened sufficiently to keep the chin on the chest while moving to create a protective round shape and avoid whiplash. Palms and forearms should be placed on the mat to absorb the impact of later, more powerful, falls (thumbs in toward the body, fingers pointed towards the toes).

Step two – From a squatting position, fall backward while holding the same rounded position as in step one. Be certain to hold the chin on the chest as repeated attempts are done with more and more force.

Step three – Start from a standing position, drop to a squatting position and fall back immediately to the rounded body position described in step one.

Sideways Falling

Step one – From a kneeling position, fall forward while turning sideways and perform a shoulder roll.

Step two – From a standing position, drop to your

knees while turning sideways slightly to fall further to your thigh, then to your hip, and ultimately to your shoulder, rolling sideways to your back, completing a shoulder roll. Both knees should be drawn over your shoulder that has dropped to the floor first.

Spotting

Physical assistance during a gymnastics skill is known as spotting. Spots can be provided by your instructor or by a competent classmate. Skills should be learned by working through the teaching progressions described in this chapter, not by relying totally on your spotter to carry you through a skill. Spotting should be a form of assistance, not something you rely on totally to guarantee safety.

- Always communicate with your spotter so that both you and the spotter are certain of what skill you are going to perform and what direction you will be moving.
- Be certain your spotter knows exactly when you are ready to begin.
- Be certain your spotter knows how to spot that skill.
- Be certain that your spotter is strong enough to spot a person of your size.
- Do not attempt a skill with a student spotter unless your instructor has given both you and the spotter permission to do so.

Clothing and Personal Check

- Remove all jewelry, including rings, necklaces, and earrings.
- Wear your hair tied back so that it does not block your vision or hamper your spotter's performance.
- Wear appropriate footwear. Avoid heavy sneakers or shoes. Avoid slippery socks or tights (e.g., nylon), which can be dangerous.
- Never have anything in your mouth (food, gum, etc.).
- Wear clothing that is nonrestrictive and allows you to move freely but that is not baggy and loose, which might make it difficult to spot.
- Be certain your clothing is free of protruding, hard objects such as belts, buttons, rivets, or zippers.
- Secure eyeglasses.

Performance Area Check

- Be certain that the tumbling area is sufficiently matted for the skill you are going to perform. In general, the less familiar you are with a skill and/or the more difficult the skill is, the more matting you should have. However, always remember that mats are not a substitute for spotters and proper progression, nor do mats guarantee safety.
- Check the mat before tumbling to be certain it is not slippery and that it is free of faults such as rips or gashes.
- If using more than one mat, be certain they are evenly aligned, securely fastened, and free of gaps.
- Check the landing surface to ensure that the mat can absorb the weight of your landing or fall. Older mats may look safe yet "bottom out;" i.e., they lose their resiliency, providing little or no protection from the hard floor. If in doubt, always check with your instructor before using a mat.
- Be certain your tumbling area is free of traffic from other students.
- Be certain the tumbling area, especially the landing area, has ample distance between other tumbling areas, walls, and/or other pieces of apparatus.
- Avoid walking across landing mats and tumbling lanes.

Personal Safety Check

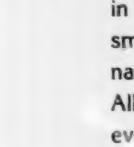
- Be certain you have thorough understanding of how to execute the skill.
- Determine if you have the necessary prerequisites to safely perform the skill.
- Determine that you are in the proper physical condition to safely execute the skill. Do not attempt a skill beyond your physical ability, no matter what the skill of the spotter is.
- Be certain you understand the proper progressions.
- Warm up sufficiently
- Stop and rest if and when you or your spotter become fatigued.
- Follow the progressions outlined by the instructor and only after instruction has been given and understood.

Instructor Safety Check

- Be certain the instructor is present in the gymnastic area.
- Be certain the instructor is aware of and has given you permission to attempt the skill you are about to perform either with or without a spotter.

Competition

Tumbling in gymnastics is usually one dimension of one event called Floor Exercise. The floor exercise area is 40' x 40' square with a rug covering mats on top of a plywood floor with springs underneath. The entire floor exercise takes slightly more than a minute to complete. Although both men and women incorporate dance elements within the routines, dance is emphasized to a greater degree in the women's events. The number and types of events in gymnastics are different for men and women (see Table 1); however, both men and women compete on the Floor Exercise. Women compete using music whereas men do not. Both the men and the women are scored on a range from 0 to 10 points with scores in the 7s and 8s being recognized as competitive and scores in the 9s being considered excellent. Although the scoring rules differ slightly from men to women and from skill level to skill level, generally the judges score for difficulty of the skills in the routine, form and execution, amplitude, composition, and originality. Both the men and women have 10 different skills levels, although the high level for women is labeled Level 10 and the high for the men is labeled in reverse, with the most skilled gymnasts competing at Level 1. Typically, in national meets, four judges score the floor exercise routine independently. Then the highest and lowest scores are discarded and the middle two are averaged. If the middle two scores are too far apart, the judges have a conference and try to resolve the discrepancies so the middle scores are in range with each other. The acceptable range gets smaller as the scores get higher. The title of best gymnast typically is given to the gymnast with the highest All Around Score, which is the total for six individual events for the men and four individual events for the women. Medals are awarded for each event plus the All Around.



Resources for Continued Participation

The national governing body for gymnastics in the United States is USA Gymnastics, located in Indianapolis, Indiana. Information can be obtained from USA Gymnastics about private clubs for instruction, publications such as USA Gymnastics Magazine (for gymnasts) and Technique Magazine (for coaches), schedules of competitions, information about prominent gymnasts and coaches, rhythmic gymnastics, and trampoline and tumbling. The contact information is as follows:

USA Gymnastics, Inc.
Pan American Plaza, Suite 300
201 S. Capitol Avenue
Indianapolis, IN 46225
(317) 237-5050
Member Services: 1-800-345-4719
www.USA-gymnastics.org

Tumbling is taught in private clubs throughout the United States. The United States Association of Independent Gymnastics Clubs (USAIGC) is a member organization of USA Gymnastics and can also provide you with a directory of clubs in your local area. The contact information is as follows:

USAIGC
235 Pinehurst Road
Wilmington, DE 19803
1-800-480-0201
(302) 656-3706
www.usaigc.org

Perhaps the most popular magazine targeted at gymnasts outside of the publications of USA Gymnastics is:

International Gymnast Magazine
P.O. Box 721020
Norman, OK 73070
(405) 447-9988
www.intlgymnast.com

Because the rules and events differ significantly between the men and women's competitive gymnastics, there are separate judges associations for each. Both men and women can judge both men's and women's competitive gymnastics, but the rules differ substantially and, therefore, different certifications are required for each. Students who wish to become involved with judging and officiating gymnastics can contact either of the following two officiating associations:

National Association of Women's Gymnastics Judges
National Gymnastics Judges Association (Men)

Your local YMCA, YWCA, YMHA, YWHA, and Boys Clubs and Girls Clubs often have instructional gymnastics classes. So do many municipal recreation programs. You can obtain contact information for your local recreation program by contacting your local municipal offices. The telephone numbers for the other organizations will be listed in your local phone book.

References

Feigley, D. A. (2002). *Tumbling.* In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education.* Reston, VA: National Association for Sport and Physical Education.

CHAPTER 24

Ultimate

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Introduction

The development of the game of Ultimate has its roots in the late 1960s. The opportunity to play a game having few rules, no referees, and only three to seven players proved to be a major part of its attraction. The "Spirit of the Game" sportsmanship, fair play, adherence to the rules, and mutual fun are fundamental to the sport. In addition, it contains strategies and movement patterns similar to football, basketball, and soccer. However, if not for the development of the plastic flying disc, it would have never come to be.

The origins of the "frisbee" can be traced most accurately back to the early 1900s and the Frisbie Pie Company of Bridgeport, Connecticut. Company workers were regularly seen tossing the pie tins for fun while on break. Pie tin tossing spread to the nearby college campuses, where the "frisbee" fad took off and obtained its widely popularized name.

Fred Morrison is credited with having invented the first plastic flying disc, the "Flying Saucer," in 1948. He teamed up with the toy manufacturer Wham-O to produce and market the "Pluto Platter" plastic flying discs in 1956. Wham-O patented the name "Frisbee" in 1958 and began marketing the flying discs throughout the country. In 1968, at Columbia High School in Maplewood, New Jersey, a group of students developed the rules for a new game played with a flying disc. They called it Ultimate frisbee. Today, this sport, now known simply as "Ultimate," has spread throughout the United States and around the world (*The Complete Book of Frisbee*).

Fitness Requirements

Ultimate, like football, basketball, and soccer, requires that all players be physically fit. In terms of preparation, many of the requirements are the same for Ultimate as they are for basketball and soccer. Sprinting and jumping are major parts of the game of Ultimate.

With this in mind, players need to warm up and train for a game with a high level of aerobic activity. A warm-up can be defined as a series of activities and/or exercises that prepare the body for a high level of activity. Therefore, players need to prepare the body first by stretching. When stretching, it is important to start with large muscle groups and work to the smaller muscle groups. An example of this would be to start with the legs (hamstrings, quadriceps, and gastronomies) and the back (trapezius and rhomboids), and then move to the abdominal muscles and obliques. From here, you could shift your focus to the shoulders (deltoids) and chest (pectorals).

If the weather is cool, it might be advisable to perform some type of simple aerobic activity to warm the body slightly before starting the formal stretching. Jogging in place for 30 seconds to a minute or even playing a tag game would be fine. For all of these stretches, remember to avoid bouncing or ballistic stretching as well as rapid movements of the head and neck when working that area.

Once you have warmed up adequately, you are ready to begin running. When training for running, you should start with an aerobic base. This means that your body is conditioned to running steadily for a somewhat extended period of time, possibly six or eight minutes. If you can do this with minimal fatigue and a quick

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recovery, you are ready to begin mixing in some anaerobic sprints.

You also need to think about warming up for throwing. Here you can work with a partner and start by throwing short distances and gradually lengthening the distance. Be sure to warm up with each of the throwing techniques you use by varying your tosses as you open the distance. This is also an excellent time to work on technique and accuracy as you can focus on your grip, stance, and throw.

Skills

The primary skills of Ultimate are the throwing and catching skills. The more skills you have in your bag of tricks, the more effective and successful you will be in game situations. However, all of the throwing techniques and even your ability to track and catch a flying disc require a basic understanding of how and why the disc behaves as it does.

Think of the disc as an airplane wing. When the disc is thrown, it must be thrown with a snap of the wrist to create spin. That spin and forward motion develops air pressure under the disc while the shape of the disc's top makes the air travel further over the top, reducing air pressure. This combination acts like an airplane wing, creating lift.

Again using our example of an airplane wing, for the plane to fly straight, the wing must be flat or parallel with the ground. The same is true for the flying disc. For it to fly straight, it must be released flat and level. If you want the disc (airplane) to bank or curve left, then you simply tilt the left edge down as you release the disc. In order for it to curve to the right, tilt the edge to the right. And if you want the disc to stall in the air and even come back toward you, you must tilt the front edge up.

Keeping these principles in mind, you can predict or at least anticipate the direction a flying disc will take. By watching the tilt of the edge as the disc takes flight, you can begin to move in the direction of the tilt. Practice will make this clue to direction a major advantage as you track the disc in the air.

Flying Discs

Selecting a disc that is the right size and weight for you is important. Lighter discs are more likely to be blown around in a breeze. Heavier discs can be hard to throw with small hands and are more difficult to catch.

If you are a younger, smaller player, you should be using a smaller, lighter disc, possibly up to 100 grams in weight. As players get older and stronger, they can choose a disc that weighs more. The sensible sizes are 120 or 141 grams for younger players and 165 grams and up for older players. Discs used in national and international Ultimate competitions are 175 grams.

Throwing

Backhand or Cross Body Backhand

Grip—Hold your hand palm up and place the disc in your hand. Your thumb is on top, with your index finger along the side and your remaining fingers curled under the edge (Figure 1).

Throw—Stand sideways to the target with your throwing arm side forward. Reach back with your throwing arm and pull the disc forward, releasing the disc directly at the target. For added power, try stepping toward the target and/or moving all your fingers under the edge (Figure 2).

Footwork—In Ultimate, a thrower must maintain a pivot foot (like in basketball). Right-handed throwers should keep their left foot stationary and step forward or across their body with their right foot (opposite for lefties).

Forehand

Grip—Hold your hand palm up, with special attention to your thumb, index finger, and middle finger. Place the disc in your hand so that your fingers are under the near edge of the disc and pointing forward. Now cock your wrist back (Figure 3).

Throw—Bring your throwing arm back at a height of somewhere between your chest and your hip. Step toward the target and bring your arm forward with the outside edge of the disc tip slightly down. Snap your wrist as you reach the release point (Figure 4).

Footwork—Again, a right-handed thrower should keep the left foot stationary (pivot foot) and step laterally or forward with the right foot during the throwing motion (opposite for lefties). This footwork is different from footwork when throwing a ball, primarily because of the need to keep a single pivot foot for all throws.

Overhand

Grip—Place the disc in your hand with your thumb on the inside bottom edge and your fingers on top. Then cock your wrist back.

Throw—Face the target and extend your throwing

Figure 1. Backhand Grip

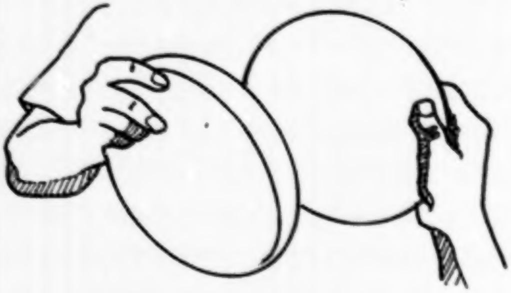


Figure 2. Backhand Throw

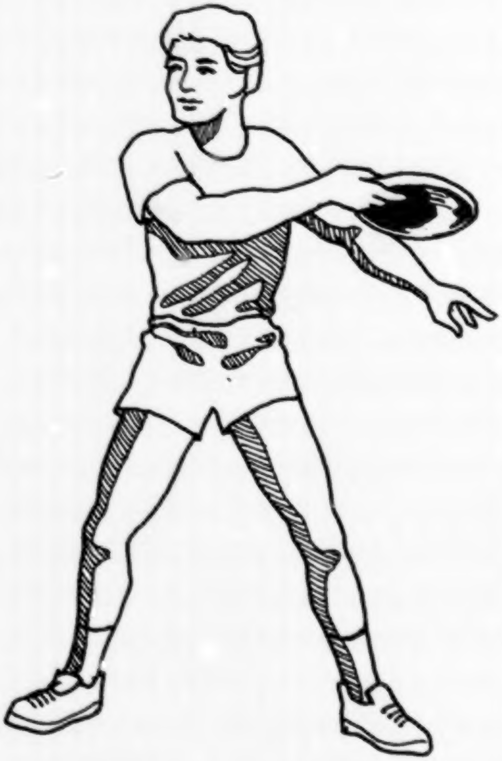


Figure 3. Forehand Grip

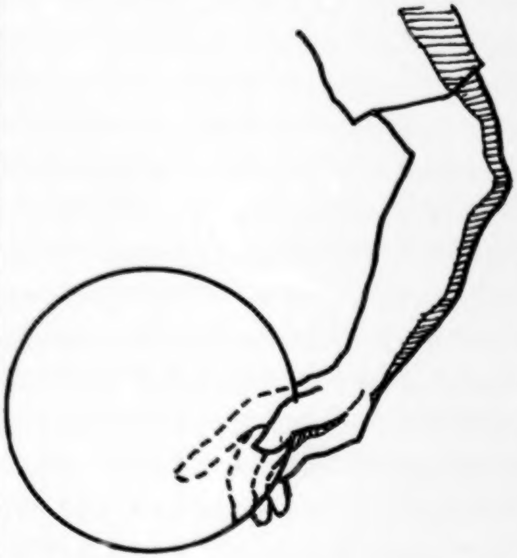


Figure 4. Forehand Throw

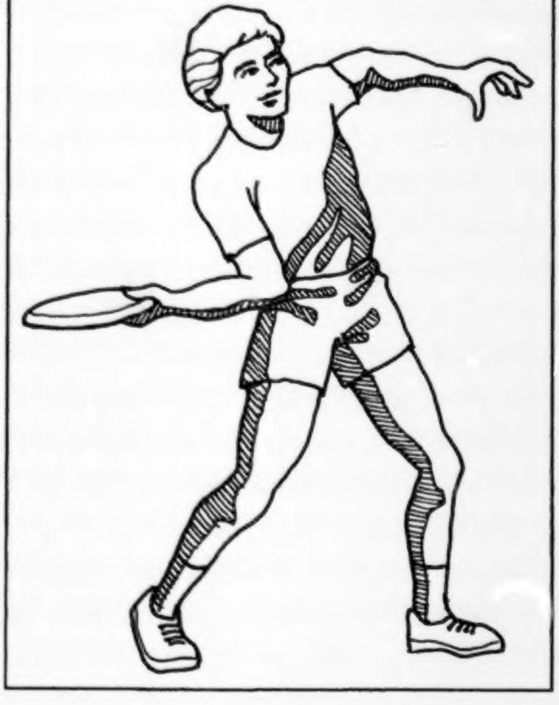
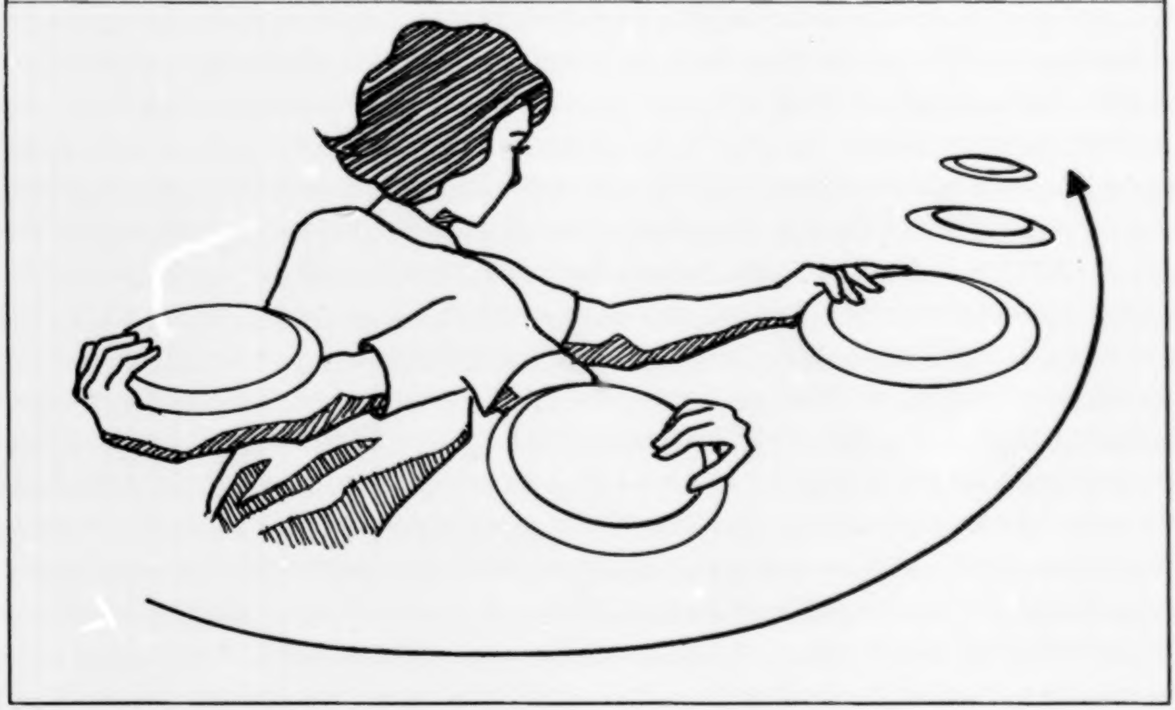


Figure 5. Overhand Throw



arm back at about shoulder height. This will force your arm to be straight out and back. Pull your arm forward and snap your wrist. Remember to keep the disc at shoulder height (Figure 5).

Footwork—Keep the same pivot foot as for the forehand and backhand. Typically, you will step back as you extend your throwing arm back (keep your pivot foot down). As you bring your arm forward to release, shift your weight from your back foot to your front (pivot) foot (similar to a serve in tennis.)

Catching

Sandwich or Pancake

Simply trap the disc between both hands with one hand on top and one on the bottom of the disc. Be sure to keep your eyes on the disc (Figure 6).

One Hand

The basic one-hand catch is with your thumb down and your fingers together and up, forming a horseshoe shape with the opening toward the disc. Remember that the disc is spinning and that catching it will require some practice. The horseshoe should have the fingers

Figure 6. Sandwich/Pancake Catch

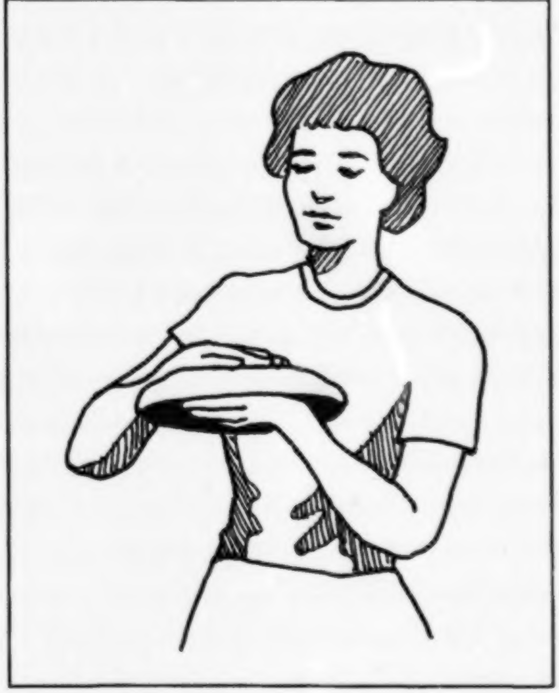
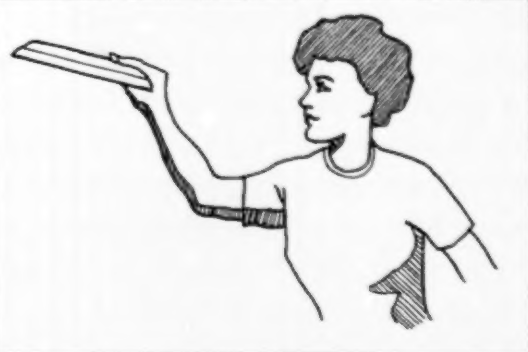


Figure 7. One Hand Catch



on top and the thumbs down for a throw that is waist-high and above; for a throw below the waist; the position should be with the thumb up and fingers down.

You may find it more comfortable at first to use both hands (a double one-hand) in this fashion to make the catch. As you become more comfortable, you should use the one-hand technique with your hand (horseshoe) facing in any number of directions (Figure 7).

Practice for Improvement

With each of the following practice activities, you are trying to do the following:

Throwing—Be smooth and accurate.

Catching—Watch the spin and release of the disc so that you can anticipate its flight.

1. Get the feel of your disc—Take your basic backhand grip and toss the disc up edge-first in front of your body. Start with a toss of about 12 to 18 inches. Practice spinning the disc and then catching, first with a pancake catch and then with your double one-hand and finally with the one-hand catch. Make your tosses a little higher each time. You can stop when the tosses reach about 3 or 4 feet in height.
2. Toss and catch with a partner—Play catch with a partner. Work on your smooth arm motion and level release. Remember to keep the distances reasonable. It's important to be successful so you do not become frustrated and the fun stops.
3. Toss and catch progression—With your partner, toss and catch the flying disc. Each time you have a successful catch, move back a step. If you have a miss, move in a step. As the distances open up, you will see the importance of getting a good wrist snap and spin on your throw.
4. Accuracy—Throw to a marker or hoop target on the ground. See how close you can get to the target and move back as you need to raise the level of challenge. Try throwing through a hoop that is hanging from a tree, goalpost, or other overhang. Open the distance for greater challenge.
5. Moving target—Form a group of three. Toss the disc randomly from one person to another. As you practice, try moving in and out, left and right, and around one another.
6. Keep away—Using your group of three, now add a fourth person. The threesome are the offense and have control of the disc; the forth person will be the defender. The object is for the defender to try to intercept a pass, force a bad pass, or knock down any passes. The offense tries to successfully complete five passes in a row. If a pass is intercepted, knocked down, or missed by the offense, one of the three players becomes the new defender. If the offense can complete five passes, one of the offensive players switches with the defender. Work out the rotation before you begin.
7. Small-sided game—On a small field (half the size of regulation), play 3 on 3 or 4 on 4 games. Having fewer players will give everyone more of a chance to handle the disc and will make it easier for everyone to learn skills and strategies.

Safety Concerns

1. Inspect your playing area. Be sure that the ground is as level as possible and even—without depressions or holes where someone could turn an ankle or worse.
2. Look for stones, broken glass, sticks, or anything else that could be a hazard if fallen or stepped upon. Are there any other obstructions that could cause a person to trip and fall? Are there trees, benches, trashcans, or any other objects near the playing area that a player could run into? In any of these circumstances you must either correct the situation or find another open field to play on.
3. If there are more than one playing fields being used, be sure that there is a safety or buffer zone between the fields. Players from one game crossing into another can cause a nasty collision.

4. Check the condition of your flying disc. If the disc has a crack in it, you should replace it. If the bottom edge is rough, you should smooth it out with fine sandpaper or steel wool.
5. Is the disc the correct weight for everyone in the group? An inexperienced player with a heavy disc may injure the hand or shoulder or misplay the disc off the body or face.

Competition

Rules

Playing Area. A regulation playing field is 70 yards long and 40 yards wide, with goal zones of 25 yards (Diagram 1).

Players. A regulation game has seven players per team.

Referees. There are no referees. Players make their own foul and out-of- bounds calls.

Fouls. If an offensive player is fouled, play resumes at the spot of the infraction. If there is a disagreement about the foul, it will be a replay. No physical contact is allowed. Picks and screens are also against the rules.

Starting the game. Play begins with a throw off or "pull" from the goal line. The offensive team receives the disc.

Advancing the disc. The disc can be thrown in any direction. When a player catches the disc, he or she becomes the "thrower" and has 10 seconds to pass it again. The defender "marker" counts the seconds out loud (stalling). The defender can be only one disc width from the offensive player. If the offensive player holds the disc for longer than the 10 seconds, possession goes over to the defense.

Change of possession. If a pass is dropped, blocked, goes out-of-bounds, or is intercepted, the defense takes possession of the disc and becomes the offense.

Scoring. A score occurs when the disc is caught in the goal zone. Play begins again with a "pull." The game ends with 21 points and a winning margin of 2.

Substitutions. Substitutions are made after a point is scored or during injury timeouts.

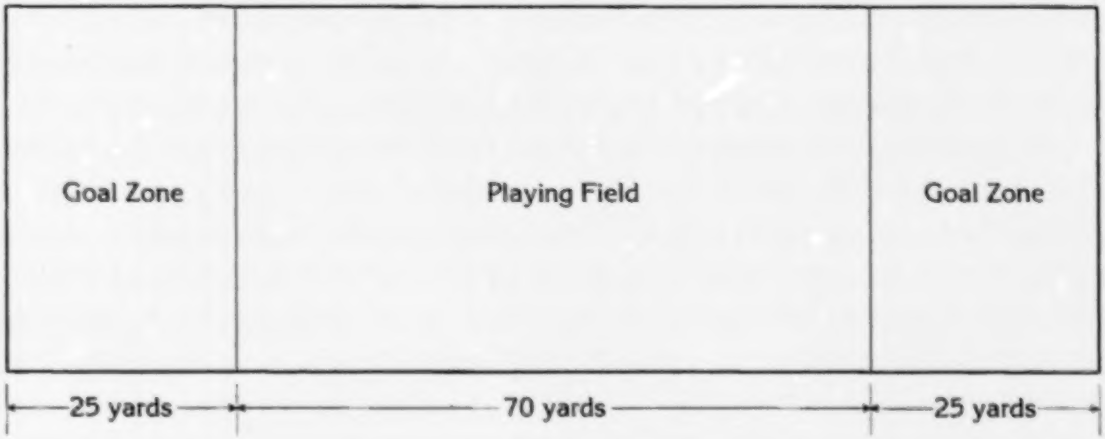
Tactics

Offense

In a seven-player game, tactics revolve around the proper use of players. Players are generally divided into three categories: "handlers," "mids," and "longs."

- The most accurate throwers are usually the "handlers." Most teams use three handlers.
- The most maneuverable players are the "mids." They need to cut and dodge in the middle of the field, working to get open. Two players normally fill this role.
- The fastest players are the "longs." They need to get downfield or into the end zone. To do so, they must judge how far to go so that they do not

Diagram 1. Ultimate Playing Area



outrun the "handler's" ability to throw. They also need to be able to track the long and sometime curving throws that come their way. Two players usually fill this responsibility.

There are many different offensive sets, strategies, and positions. This description of one offensive set should help get a team started. The basic idea remains, however, that at some point every player gets to be a "quarterback" and every player gets to be a receiver.

"Mids" and "longs" need to find ways of creating space between themselves and their defenders. This may involve any number of patterns and moves. Some may include coming back to and behind the "handler" if need be. Remember, it is essential that mids and longs in particular have throws lead them so that they can catch on the run. Having to stop or even wait for the disc will only aid the defense. Also be aware that both teams will be learning about their opponents' strengths and weaknesses and developing their tactics during the game.

Defense

Defense is usually one-on-one. If teams play otherwise, someone will be free and uncovered. Defenders need to be able to "stick" to their opponent. Focus on the other player's belly button. If a player is going to make a quick cut or dodge in any direction they cannot do it without turning their belly buttons in that direction. Watching head and shoulder movements can only get you "faked" out.

Be aware that trying too hard to steal passes can leave an opponent open. Also keep pace with the person you are defending. If you overrun them or can't keep up, they will have the advantage.

There are also a variety of defensive sets, including zone defenses. Remember, on defense, the "marker" (person covering the thrower) should count out the "stall count" (at one-second intervals). If the marker gets to 10 before the thrower releases the disc, it is a turnover.

Tip: As you get better at defense, try forcing the offense to throw one direction by "marking" them on one side or the other. This allows your defense to focus on one side of the field.

Resources

Ultimate Players Association
3595 East Fountain Blvd.
Suite J2
Colorado Springs, CO 80910
1 800-872-4384

For complete official UPA rules:
www.cs.rochester.edu/u/ferguson/ultimate/ultimate-rules.html

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Demas, K. (2002). *Ultimate.* In N. J. Dougherty (Ed.) *Principles of safety in sport and physical education.* Reston, VA: National Association for Sport and Physical Education.

Malafronte, Victor A., and Johnson, F. Davis. (Eds.). (1998). *The Complete Book of Frisbee.* Alameda, CA: American Trends Publishing Co.

CHAPTER 25

Volleyball

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Introduction

The sport of volleyball was invented in the United States in 1895 by William G. Morgan while Morgan was working in a YMCA in Holyoke, Massachusetts. Morgan needed a less strenuous activity to meet the needs of some businessmen who would not play basketball. After experimenting with various balls, including the bladder of a basketball, Morgan decided no ball then available satisfied the needs of the new game, which he called mintonette. The Spalding Company eventually provided the first official ball, which was made of soft calfskin. In 1896, during a demonstration of mintonette in an old gymnasium at the School of Christian Workers (now Springfield College), a faculty member, Alfred T. Halstead, suggested that because the volleying action was such a characteristic of the game, the name of the activity should be changed to volleyball. Morgan accepted this change, and the game of volleyball began to evolve to its present form.

Volleyball can be enjoyed by players of all ages. It is one of the few sports in the United States that has competitions in various age groups from an elementary level to the master's level. It is also adaptable to many settings—from the informal to the highly competitive. Volleyball is the only team sport that has been played professionally on a coed basis. Although Morgan designed the game to be less arduous than basketball, it has developed into a highly strenuous sport. When played by two teams that are closely matched in ability, a best-of-five match can last for as long as 2 hours. During this time, players are constantly moving, changing direction, jumping, and hitting the floor for defensive saves.

The addition of volleyball to the Olympics by the Japanese in 1964 helped increase its popularity. Volleyball is high on the list of participation sports throughout the world. Over 25 countries currently list volleyball as their number one sport. The success of the United States teams during the 1984 Olympics in Los Angeles was a real boost for the growth and development of the sport in this country.

Terminology

Attack. The act of sending the ball to an opponent in a forceful manner. Often used synonymously with spike.

Attack Line. The line on the court that is 9'10" (3m) from the centerline.

Back Set. A set in which the setter faces away from the intended direction of the ball and sets overhead to a waiting spiker.

Base Formation. The position of a team while their opponents play the ball and the team waits to decide their counter move.

Block. When a player jumps close to the net, extending both arms over the top of the net with the hands in a wide position, fingers spread, to prevent an opponent's spike from crossing the net.

Centerline. The court marking directly under the net dividing the court into two equal sides.

Cross-Court Spike. A spike directed diagonally to the longest part of the opponent's court.

Dig. A one- or two-armed save in which a player has difficulty getting to the ball and passes it high so that a teammate can play it.

Double Fault. A play in which faults are committed

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by players of both teams at the same time. The point is replayed.

Down-the-Line Spike. A spike directed along the sideline closest to the spiker.

Floater. A serve, hit without spin, causing the ball to move up, down, and/or side to side as it responds to air currents.

Forearm Pass. The passing action in which the ball rebounds off the forearms and is directed to a teammate. It is also referred to as a bump.

Free Ball. Any ball coming from the opponents that is not a spike or attack.

Heel of the Hand. The solid part of the hand that is close to the wrist.

Jump Serve. When a player tosses the ball and jumps into the air to hit it forcibly over the net into the opponent's court.

Let Serve. A serve that hits the net and still goes over into the opponent's court.

Middle-In. A defensive formation in which the center back plays directly behind the block to cover against the tip.

Off-Hand. A spike in which the ball must cross in front of the spiker's body before being contacted by the spiker's dominant hand. The set comes from the spiker's nondominant side.

On-Hand. A spike in which the ball is set from the same side of the spiker's body as the dominant hand.

Opening Up. The action of all players during serve reception who are not going to receive the serve. They all turn and face their teammate who is receiving and has indicated this by calling for the ball.

Overhand Pass. A pass in which the player plays the ball with open hands in a position 6 to 8 inches above the forehead.

Power Alley. That portion of the court where most spikes are aimed. It is the diagonal from the spiker's hand to the opposite corner of the opponent's court.

Rally Scoring. A system of scoring in which a point is awarded for every serve and resulting rally.

Seam. The space between two receivers during serve reception.

Serve. The act of putting the ball in play. The ball is hit from behind the end line and in the serving area so that it clears the net and enters the opponent's court.

Serving Area. The area behind the entire end line, outside of the court. The place from which players serve.

Set. The placement of the ball to enable the spiker to attack it directly into the opponent's court.

Side Out. When the serving team makes a fault and the receiving team gains the serve.

Spike. A ball that is hit with great force from a position higher than the top of the net so that it drops at a sharp angle to the opponents.

Target Area. The area to which the players pass the ball when receiving serve or any other ball from the opponents. The setter is usually in the target area. In a 4-2 offense, this area is the center of the court close to the net.

Tip. A soft, off-speed, change-of-pace play in which a spiker attempts to catch the opponents off guard. The ball is hit with the fingertips of one or both hands so that it just clears the block and drops quickly to the floor.

Topspin. A ball that is hit by a player using a wrist snap that causes the ball to rotate away from the hitter, resulting in a quick dropping action.

Fitness Requirements

Volleyball is played at many different levels. People enjoy the sport as a backyard picnic activity or as a highly competitive match. The level of fitness required depends on the level at which you choose to compete. A general overall fitness level is necessary at the lower level of play. If you select to participate at the higher levels of play, you must become a highly conditioned athlete. High school, college, and Olympic level athletes follow a rigorous conditioning program to be ready to compete injury-free. For the occasional once-a-week athlete, it is necessary to stretch before beginning to compete. General stretching exercises that stretch the arms and legs, back and shoulders, ankles, and neck usually will prepare a player for a match.

Cardiovascular conditioning is also important. Matches between two opponents that are very close in ability could last as long as 3 hours. Although there is not a lot of long distance running involved, a player needs to be able to change directions constantly and quickly. Agility training is essential. The ability to jump is also important. Players want to jump as high as possible when spiking and blocking. The setter often jump sets the ball. Jumping as often as you do in a volleyball match consumes a lot of energy. Players must train for this. The popularity of the jump serve increases the number of times in a match that a player may jump.

Skills and Techniques

To be a successful volleyball competitor, one must be able to perform the five basic skills of the game at an efficient level of control. These five basic skills are the forearm pass, the overhand pass or set, the serve, the spike or attack, and the block. The block is only essential when playing against a team with strong spiking. Other advanced skills, including the dive, sprawl, and roll are only essential at higher levels of competition. The soft attack or tip is an excellent change of pace and can also be mastered at beginning levels of play.

Forearm Pass

The foreman pass is used to receive the serve, to play any ball arriving low and with force, to receive spikes, and to play any ball below chest level. It is an extremely important skill because it is usually the first contact made by the team receiving the ball from the opponent. The skill is quite different from any that exist in other sports because the ball is contacted on the fleshy part of the forearms. The hands are gripped together and can be joined in a number of acceptable ways. The best position is placing one hand across the palm of the other and then cupping both hands so that the thumbs are together and facing up toward the ceiling (see Figure 1a). Options for more advanced players include joining both hands by lightly interlocking the fingers with the thumbs side by side and on top (see Figure 1b) and making a fist with one hand and wrapping the second hand around the fist with the thumbs on top, side by side and parallel. It is important that the thumbs do not overlap, as this creates an uneven surface, causing an uncontrolled hit if the ball is accidentally received on the hands. The elbows are rotated in so that the widest portion of the forearm faces upward. The elbows can be bent or locked as the ball approaches but must be locked at contact. The ball is contacted between the wrist and the elbows. The arms should be held away from the body and parallel to the thighs. The back should be erect and leaning slightly forward. The knees are bent at approximately a 90-degree angle; the feet are shoulder width apart and in a stride position with one foot forward, usually the right foot. The shoulders should face the intended direction of the pass. The position of the body in relation to the target is essential if the player is to successfully direct the pass. If time allows, the player should always establish a set body position before contacting the ball rather than passing the ball while still moving.

Figure 1a. Cupped Hand Grip with Thumbs on Top

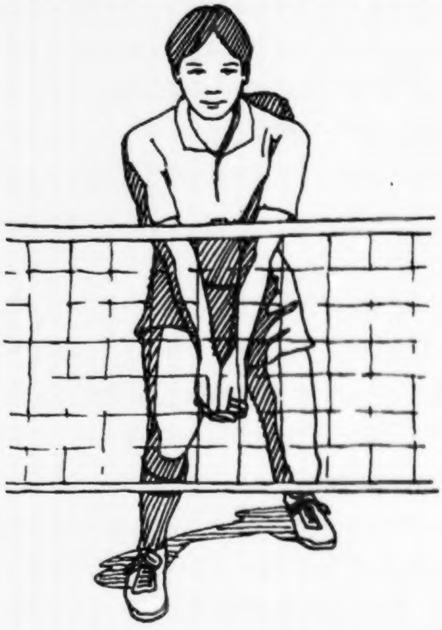
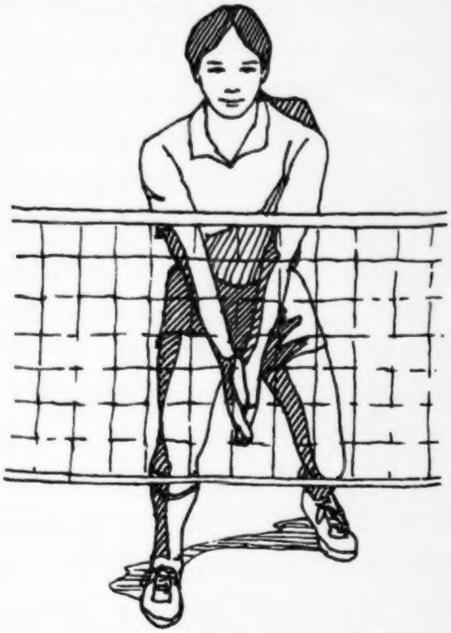


Figure 1b. Interlocking Hand Grip with Thumbs on Top

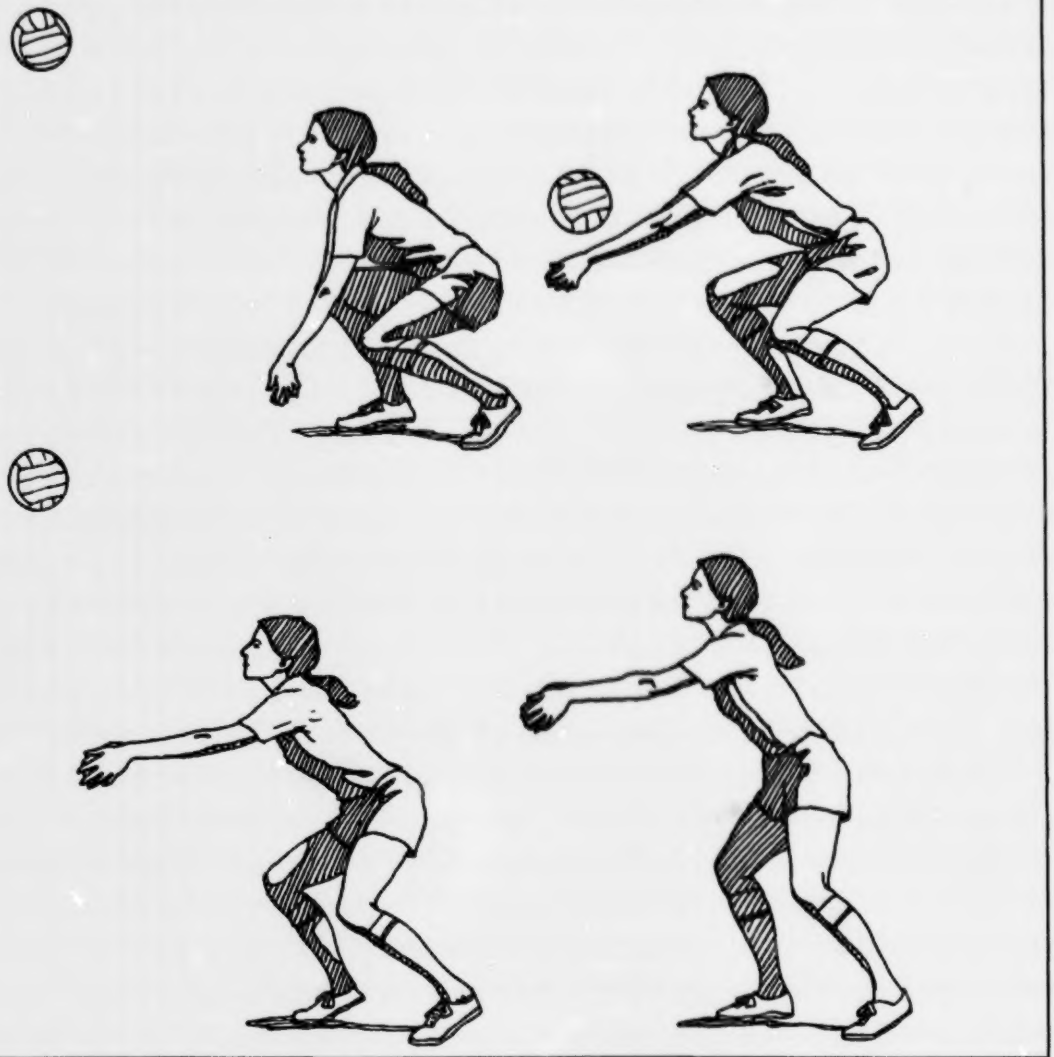


As the ball approaches, the player gets behind it so that the ball is played in front of the midline of the body and the player is in a low position. The player's eyes should be kept on the ball until it contacts the arms. The ball should be contacted low between the chest and the knees. As contact is made, the knees are extended slightly, which causes the arms to rise and make a punching motion at the ball. At the same time, the weight is transferred forward in the direction of the pass. The arms should not rise above shoulder level on the follow-through.

The three most common faults by beginners are too much arm swing, bending at the waist instead of the knees, and transferring weight away from the intended direction of the pass. Figure 2 shows the forearm pass in a series of pictures. Check the following points of emphasis:

- The position of the body at contact
- The point at which the ball contacts the arms
- The locked elbows on contact
- The transfer of weight from the back to the forward foot

Figure 2. The Forearm Pass



- The extension of the legs and arms
- The height of the arms on the follow-through

Players may not always be able to position themselves squarely behind an oncoming ball. In this situation, the ball should be played outside the midline of the body and with one or two arm(s) or hands(s). If the ball is played with one arm, the hand should be held parallel to the floor so that contact is made with the flat surface of the arm at the wrist. If the ball is contacted on the hand, the player should break the wrist (extend or flex it) to help direct the ball. If the ball is played to the left or right of the body with two arms, the shoulder closest to the ball should be dropped or dipped so that the platform made by the arms will direct the rebound in the same direction from which it came. If this is not done, the direction will not change, and the ball will continue in the same direction, past the player, and out-of-bounds.

When any hard-driven ball is received, it is referred to as a dig. A one-armed reception is also referred to as a dig. The forearm pass is often referred to as the underhand pass or bump. Although these terms are used interchangeably, the forearm pass is the most descriptive term for the actual skill.

Players should have enough control over their passing to perform the following tasks:

- Self-pass the ball 15 consecutive times.
- Pass the ball against the wall, to a height greater than 8 feet, 15 consecutive times.
- Pass the ball with a partner 10 consecutive times.
- Receive 5 out of 10 serves that come directly to the player by passing them to a target area with enough height so that they can easily be handled by the setter. The target area is the center one-third of your side of the court and close to the net.

Overhand Pass or Set

The overhand pass is the most accurate method of playing the ball. It is used to receive any ball chest height or higher and traveling slowly in a high arc. It is also used as a second contact of a team as it sets up its offensive. When used in this manner to deliver a ball to a spiker, the overhand pass is also referred to as a set.

In executing the overhand pass, a player must first move into the correct position. As in the forearm pass, it is extremely important that the player establish a set body position before playing the ball. When a player is executing an overhead pass, the shoulders must be square to the desired direction of the pass. The hands are raised to a position just in front of the forehead, and the player continues to look through the window formed by the hands. The ball is contacted 6 to 8 inches above the forehead. The hands are cupped around the ball, on the sides of the ball more than directly behind it. The thumbs should be closer to each other than the first fingers. The contact points on the fingers are the upper two joints. The greatest force comes from the thumbs and the first two fingers of the hand, but all fingers do contact the ball. The action of the set is like a very quick catch-and-throw motion, but the ball never comes to rest. The angle of the elbows should not decrease as the ball is contacted, and the fingers should be held firmly throughout. The wrists are hyperextended, and the hands and wrists are both relaxed.

The body should be in an upright position and leaning slightly forward, with the knees bent and the back straight. The feet should be in an easy stride position, with the foot closest to the net always forward. This helps prevent the ball from going over the net into the opponent's court, especially during a set.

On contact, the wrists flick the ball forward as the elbows and knees extend and the weight is transferred toward the direction of the pass. The arms are fully extended on the follow-through, and the hands point in the direction of the pass. The ball should be directed with good height.

Figure 3 shows the overhand pass in a series of pictures. Check the following points of emphasis:

- The position of the hands and arms before contact
- The bent position of the knees and elbows before contact
- The fully extended arms on the follow-through

The player can increase the complexity of the sets by varying the height and speed with which they are delivered to the spiker. At beginning levels of play, a high set is recommended almost exclusively.

The set can also be sent backward over the player's own head to a teammate behind the setter. This is called a back set. Everything is the same as in the front set until the point of contact. The player arches the back and pushes the ball straight up toward the ceiling, extending the arms and knees. The weight transfer will be back in the direction of the pass. The back set is very effective, as it often catches the opponent off guard.

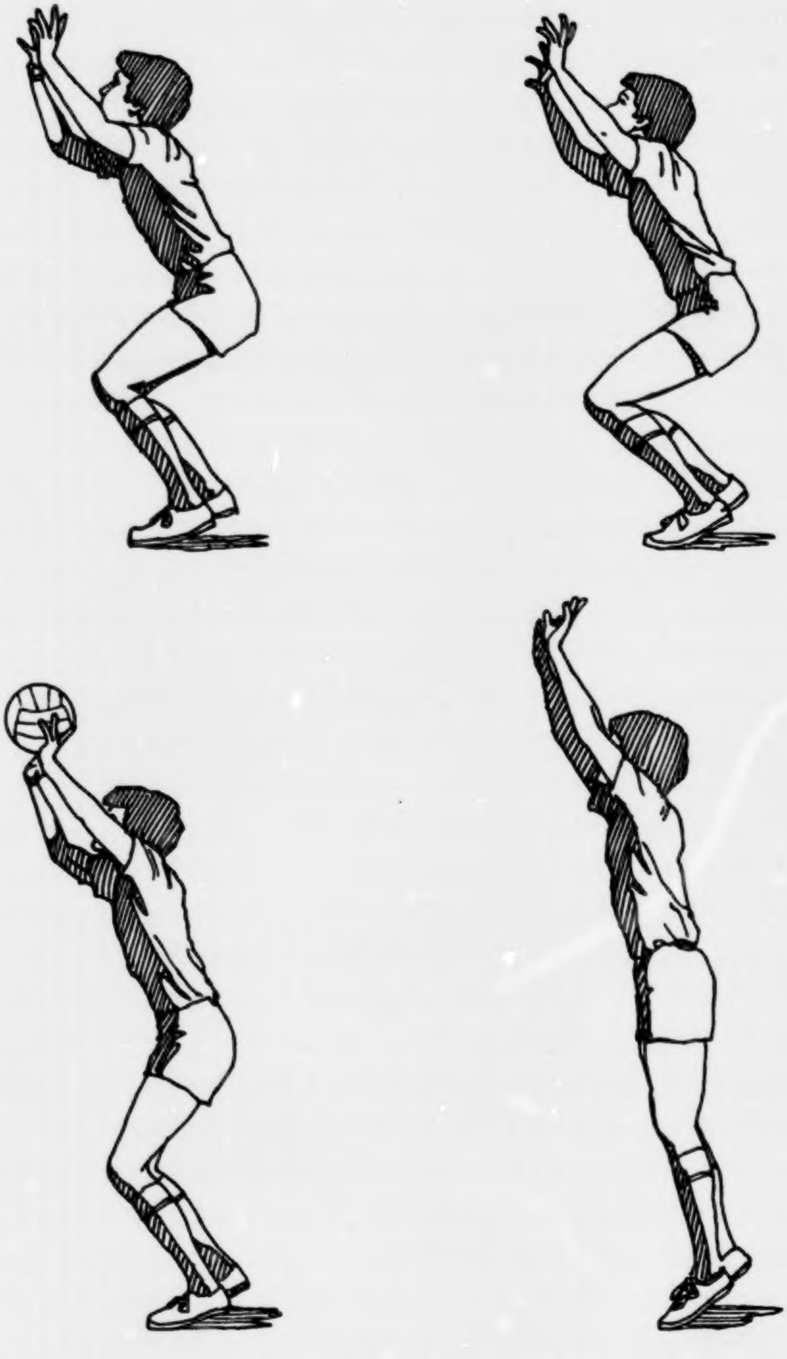


Figure 3. The Overhand Pass

All players should be more accurate when using the overhand pass than when using any other volleyball skill. The setter is the player who will set the spikers the greatest percentage of the time and should be excellent at performing this skill. All other players must be able to set effectively when the setter cannot make the second contact.

Players should be able to complete the following tasks:

- Overhand pass the ball to themselves 20 consecutive times.
- Overhand pass the ball consecutively against the wall 20 times to a height of 11 feet.
- Complete 20 overhand passes while receiving a tossed ball from a partner with 10 tosses made to the passer's right and 10 made to the passer's left on an alternating basis.

It is very important when practicing drills with partners that the toss be accurate. When players are practicing the overhand pass, the toss should be in a high arc.

The Serve

The serve can be one of the most important skills of the game. If a team is lucky enough to win the first serve and is a good serving team, it could get a good lead or even win the game before the opponents are able to serve. The serve has become even more important in recent years because rally scoring has been introduced, and a service error results in both a point and a side out for the opponents. There are many varieties of serves that can be mastered, and a server who has mastered more than one serve can be extremely effective. Beginners should concentrate on performing one serve until they have 90% consistency. That is, they should strive for making 9 good serves in every 10 attempts.

The easiest serve to master is the underhand serve. Many players feel that the underhand serve is not effective. This is not necessarily true. If it is the only serve a player can perform with 90% consistency, then the player should use this serve entirely until he/she masters other styles. The underhand serve is hit with less force and a higher trajectory than the overhand or roundhouse serves, but, if hit as a floater, it can have a lot of "action" on it and be highly effective. The floater action is similar to that of a knuckleball pitch in baseball. Hit without spin, the ball reacts unpredictably to the air currents, either curving, dipping, or rising. The underhand serve is hit with an open hand, the major point of contact being on the heel of the hand.

The ball should be hit with a locked wrist. The body should be facing the net, with the feet in a stride position and about shoulder width apart. The forward foot should be placed so that the toe is pointing in the direction of the serve. The foot on the opposite side of the serving hand should be the forward foot. The ball is held at waist level or lower in the nonhitting hand. The holding hand must release the ball just before it is contacted, or the serve is illegal. The hitting arm swings back as the weight is transferred onto the back foot. As the arm swings forward to contact the ball, the weight is transferred onto the forward foot. The ball should be contacted with the arm fully extended, and, as the hand follows through, the player moves forward onto the court into a position of readiness to receive the return.

It is not necessary to disguise the direction of the serve. The opponent who knows that there will be a serve to his/her position feels more pressure than one who does not expect the ball. This often causes a reception error.

The overhand floater is similar to the underhand serve as the player assumes the same initial body position facing the net, feet in a shoulder width stride position, nonserving hand holding the ball and eyes on the intended target. The holding hand begins with the ball at chest level or higher and tosses the ball in the air slightly in front of the shoulder of the hitting hand, about 2 to 3 feet higher than head height. The ball is contacted with an open hand, the heel of the hand again being the major area of contact. The wrist is locked. There should be little to no follow-through. The hitting action is somewhat like a punching motion, and the ball is contacted on the center back. The server looks at the ball as soon as the serving motion begins and should keep the eyes on the ball until contact. As the ball is tossed, the weight is transferred onto the back foot. The striking arm is cocked back into a throwing position. As the arm swings forward toward contact, it is extended, reaching full extension at contact. The entire action is similar to throwing a baseball. Once the ball is contacted, the player moves onto the court and into his/her playing position.

Figure 4 shows the overhand floater serve in a series of pictures. Note the following points of emphasis:

- The position of the tossed ball in relation to the body
- The cocked position of the arm before contact

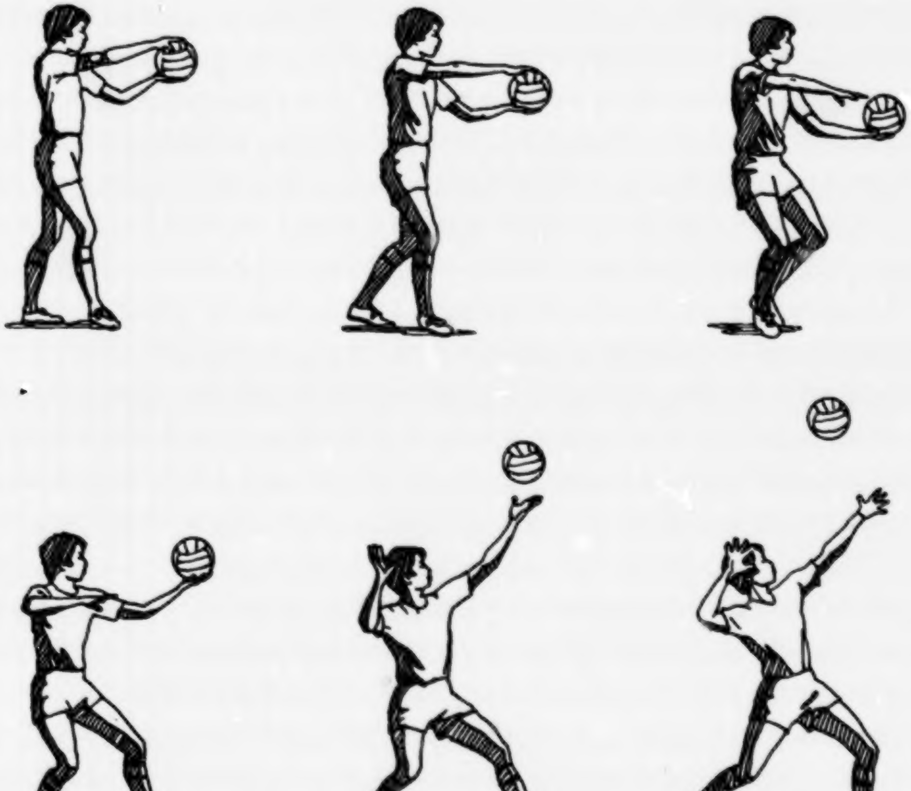


Figure 4. The Overhand Floater Serve

- The height of the ball above the shoulder at contact
- The extension of the arm at contact
- The server's concentration on the ball
- The limited amount of follow-through of the arm

Servers should have three priorities in serving. First, they must be consistent. They must be able to get the ball legally into the opponents' court on nearly every serve. Second, the server should be able to serve to any spot that might be advantageous to his or her team. Third, the server should try to "put something on" the ball, such as spin or greater force. Servers should not try for the second priority until the first is met. In side-out scoring, a serving error results in your team's loss of serve. In rally scoring, a serving error results in both loss of serve and loss of point. A weak serving team is really at a great disadvantage in a rally scoring game.

The most effective serves are directed to the deep corners of the opponent's court, to the seams (the space between two opponents), or to a weak receiver. Once players have mastered the first two priorities mentioned above with one type of serve, they can begin working on another type of serve.

Each player should be able to complete the following tasks:

- Serve 20 consecutive legal serves without a miss.
- Serve to each of the court positions in order for two full rotations.
- Serve to any court position called out by the teacher on 12 consecutive serves.

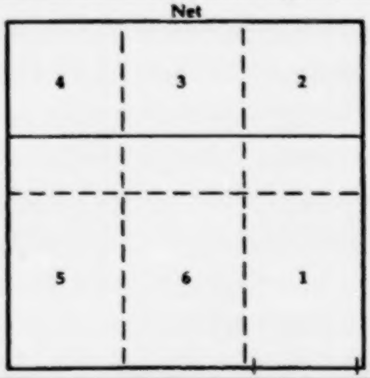
The court positions in volleyball are illustrated in Diagram 1.

The Attack or Spike

The spike is the most exciting skill of the game and at the same time one of the most difficult skills to perform. In making a spike, the player must jump into the air and hit a moving object (the ball) over an obstacle (the net) into a bounded area (the court). This task is not easy. Timing is the most important element of the spike. Spiking can be on a variety of sets. For discussion here, only the high set will be considered. This set is 7-10 feet above the top of the net.

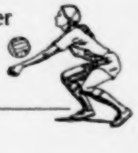
The approach for the spike begins at the attack line, 1 meter from the net. Moving toward the net can be accomplished with any number of steps, but better volleyball players limit themselves to two or three. The spiker must wait until the ball is set by the setter before beginning the approach. In order to go to the spot, the spiker brings both feet together by planting one heel first and closing with the other. The right foot should be planted first, followed by the closing together of the left foot. Some spikers prefer to jump onto both feet simultaneously, heels first.

Diagram 1. The Volleyball Court Divided into the Six Court Areas



All spiking is done with a two-foot take-off. Planting the heels changes forward momentum into upward momentum. As the heels are planted, the arms swing down and back to about shoulder height; the knees are bent as deeply as they can go and get maximum thrust and control on the jump. As the spiker extends the knees to jump, the arms are swung forcibly forward and up. The swing of the arms is very important to increase the height of the jump. The hitting hand and arm are taken back behind the head into an overhand throwing position.

At the highest point in the jump, the spiker swings the arm forward to hit the ball. The arm action is the same as that used to throw a baseball. The ball is contacted with force, with an open hand. As soon as contact is made, there is a snap of the wrist. The wrist snap is very important because it puts topspin on the ball, causing it to dip severely in flight. The hand should be open wide and fairly relaxed at contact. As with the serve, the heel of the hand is the most important hitting surface. The ball should be contacted 2 to 6 inches in front of the hitter's shoulder on the hitting side of the body. As the arm swing is made, the nonhitting arm is dropped forcibly to the player's side. This gives the player greater reach. The ball should be contacted at the spiker's greatest reach. As contact is made with the heel of the hand, the hand is snapped forward over



the top of the ball to impart a forward spin on the ball, thus directing it downward. It is extremely important that there is little to no forward motion on the jump and that the movement is as straight up and down as possible. The planting of the heels effectively stops forward momentum so that no net foul is committed.

During the follow-through, the spiker's hitting hand drops back to the spiker's side, and the spiker lands on both feet when returning to the floor. It is important that, immediately after landing, the spiker prepare for the next play.

Figure 5 demonstrates a spiking sequence. Look for the following points of emphasis:

- The plant of the heels, right and then left, and the two-foot take-off
- The high backswing of the player's arms
- The forward swing of both arms on the jump
- The full extension of the arm on contact
- The position of the ball in relation to the spiker's body (it is in front of the hitting arm's shoulder at contact)
- The snap of the wrist on contact
- The landing of the spiker on both feet

Once the player has mastered the basic elements of the spike, the angle and direction of the spike should be practiced. The two main directions of the spike are cross-court and down-the-line. A cross-court spike is hit from the spiker to the opposite corner of the opponent's court (see Diagram 2). The down-the-line spike is hit along the sideline from the spiker to the corner of the opponent's court on the same side (see Diagram 3).

Spikes are divided into two main categories: on-hand and off-hand spikes. An on-hand spike is one in which the spiker's hitting arm is on the same side of the body as the approaching set. This occurs in the right forward position for a left-handed player and in the left forward position for a right-handed player. It is the spike that a player should be the best at executing. The ball does not cross in front of the player's body before it is hit. An off-hand spike is one in which the spiker's hitting arm is on the opposite side of the body from the approaching set. The ball must cross in front of the player before being hit. This style is employed when a left-handed player is in the left forward position or a right-handed player is in the right forward position. The on-hand spike is the preferable spike for most players, but, in any case, the spiker should always hit the ball with the dominant hand.

Players should be able to complete the following tasks:

- Spike the ball against the wall at least 10 times. To spike, a player stands 6 to 10 feet from a smooth wall, tosses the ball up, and spikes it into the floor, close to the wall. The ball rebounds from the floor and wall and is caught. The spiker then repeats the process.
- Spike 5 out of 10 high sets to the on-hand side into the opponent's court.
- Spike 5 out of 10 high sets to the off-hand side into the opponent's court.

The Tip

Another form of attack is the tip. The tip is a change-of-pace play and can be used as an offensive move, to catch the opponents off guard, or as an alternative when a spike is not possible because of poor timing or a bad set. The tip is most effective when used as an offensive play.

The approach for the tip is exactly the same as the approach for the spike. In fact, this is essential to disguise the intent of the attacker. At the last minute the spiker holds back on a powerful swing, reaches as high as possible, and, with a soft fingertip touch from a position on the lower back of the ball, drops the ball over or by the block so that it falls quickly to the floor. The tip must be high enough to clear the opposing block but low enough so that it hits the floor before the opponent's backcourt defensive players can move in to "dig it up." It is essential in tipping that the wrist be held straight to avoid the possibility of a carry. There are two areas on the court most vulnerable to a tip: over the block and down the line but in front of the attack line, and by the block and to the center of the court but close to the net (see Diagram 4).

All players should be able to complete the following tasks:

- Tip 5 out of 10 sets so that they clear the block and land in front of the attack line.
- Tip 5 out of 10 sets by the block so they hit the floor near the net in the center of the court.

The Block

The block is a team's first line of defense. The best way to stop an opponent's attack is to block it at the net and not allow the ball to come into the blockers' side of the court. A single block is executed by one player. In a double block, the center forward joins the outside forward on the side of the opponent's spike,

Figure 5. The Spiking Sequence

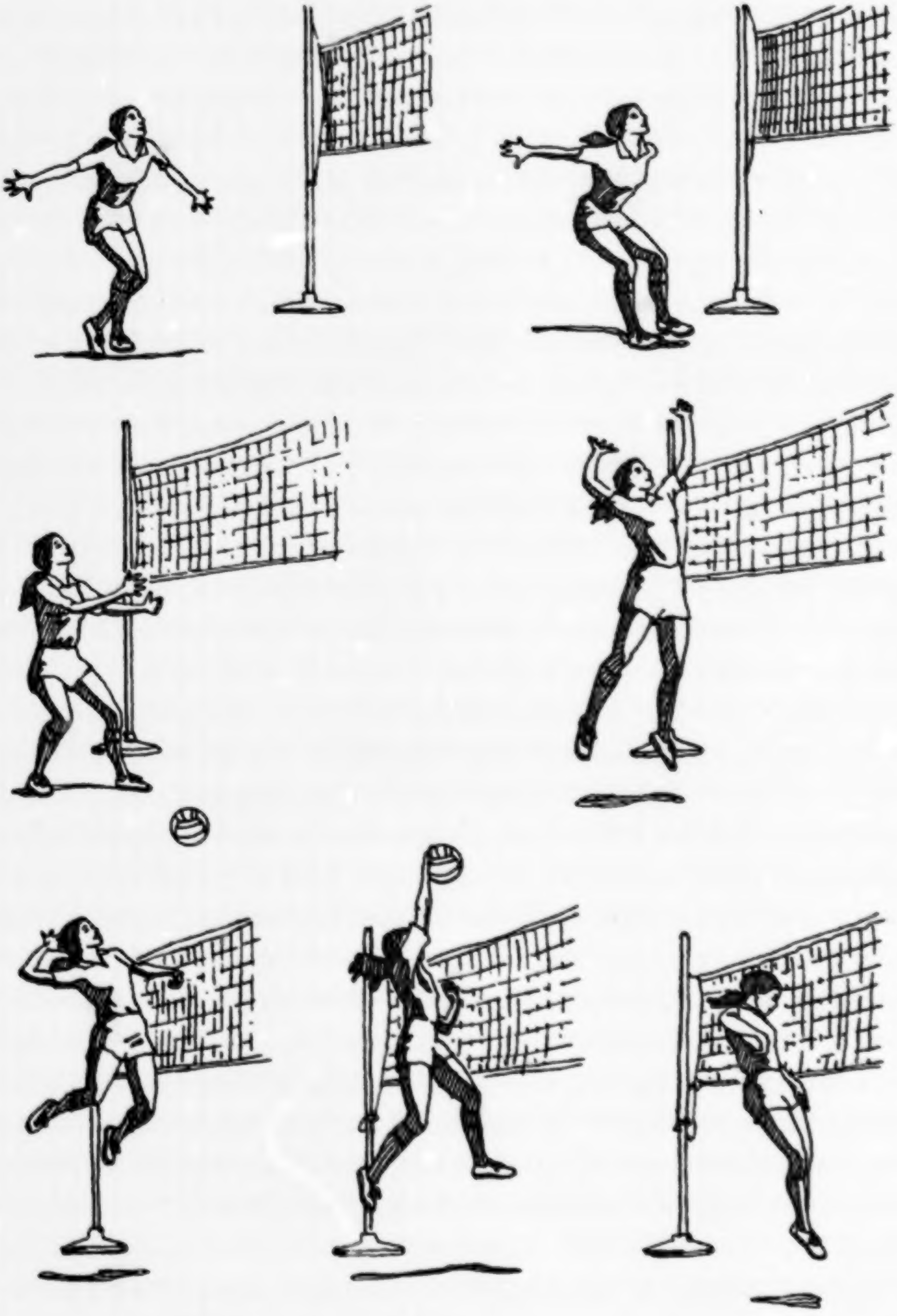


Diagram 2. Three Different Angles for Crosscourt Spiking

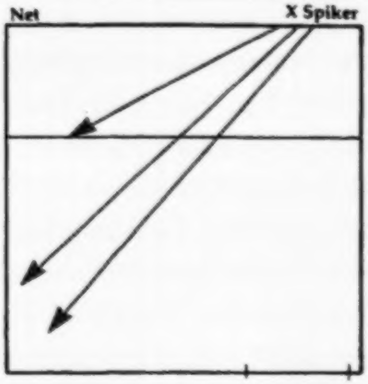


Diagram 3. Path Traveled by a Down-the-Line Spike

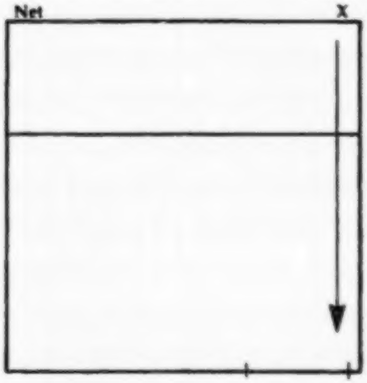
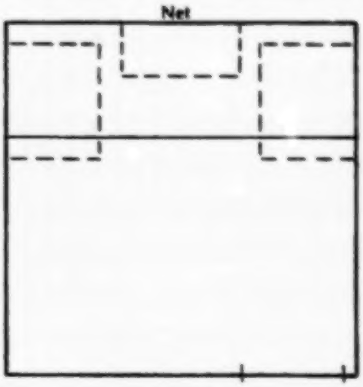


Diagram 4. The Weak Areas of the Opponent for the Tip: The left and right areas change depending on which side the tip originates. The center area is the same for both sides.



and they block together. The purpose of the block is to lessen the net area available to the spiker. A double block is, of course, more effective than a single block.

The ready position for a block is 6 to 12 inches from the net, with the arms bent at the elbow so that the hands are at shoulder height and fairly close to the body. The blocker must concentrate on the opponent's play until the ball is set to the opposing spiker. Then the blocker stops watching the ball and concentrates on that spiker. The blocker gets into position so that half of the body overlaps half of the spiker's body on the side of the spiker's hitting arm (see Figure 6).

The blocker attempts to put one hand on each side of the spiker's hand. The blocker times the block by jumping a split second after the spiker. The blocker reaches as high as possible over the top of the net and into the opponent's court. The body pikes slightly to prevent net fouls. The blocker's hands are wide open and turned so that the thumbs are up (see Figure 7).

a. The incorrect hand position on the block.
b. The correct thumbs-up position. Note the wider area that it covers.

This positioning of the hands covers the maximum amount of space. When the ball contacts the blocker's hands, the blocker snaps the wrists, causing the ball to drop quickly onto the opponent's court. The blocker must quickly withdraw the hands so that no net foul will be committed in returning to the floor. After the block, the player should be immediately ready for the next play.

Figure 8 illustrates the block sequentially.
Look for the following points of emphasis:

- The starting position of the blocker
- The position of the blocker's arms in relation to the head
- The wide position of the blocker's fingers
- The penetration the blocker makes over the net
- The pike position of the body

When blocking in the outside position, the blocker must be sure to turn the ball into the opponent's court. The hand closest to the sideline should be turned in so that the ball will not rebound out-of-bounds after hitting the block. Successful blocking involves a great deal of practice emphasizing timing. Many beginning blockers have a tendency to rush the block, jump too soon, and miss the ball completely.

Players should be able to complete the following tasks:

Figure 6. The Position of the Blocker in Relationship to the Spiker

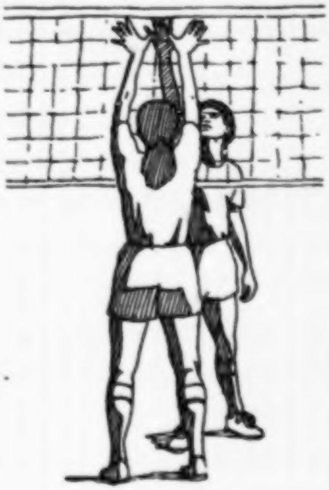


Figure 7a. The Incorrect Hand Position on the Block

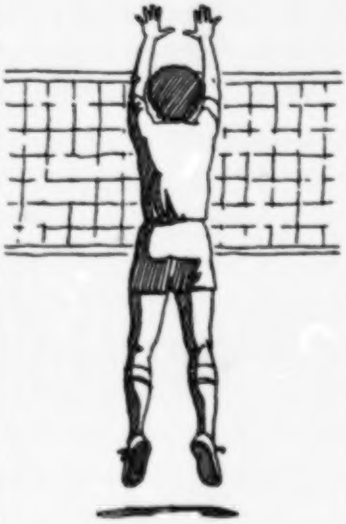


Figure 7b. The Correct Thumbs Up Position: Note the wider area that it covers.

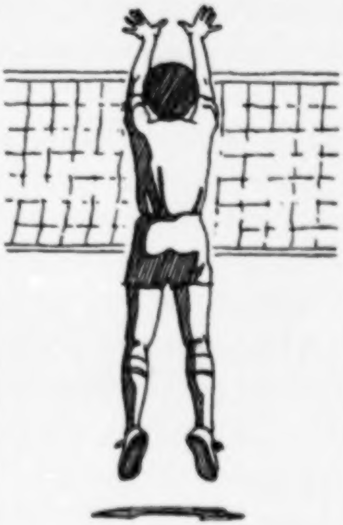
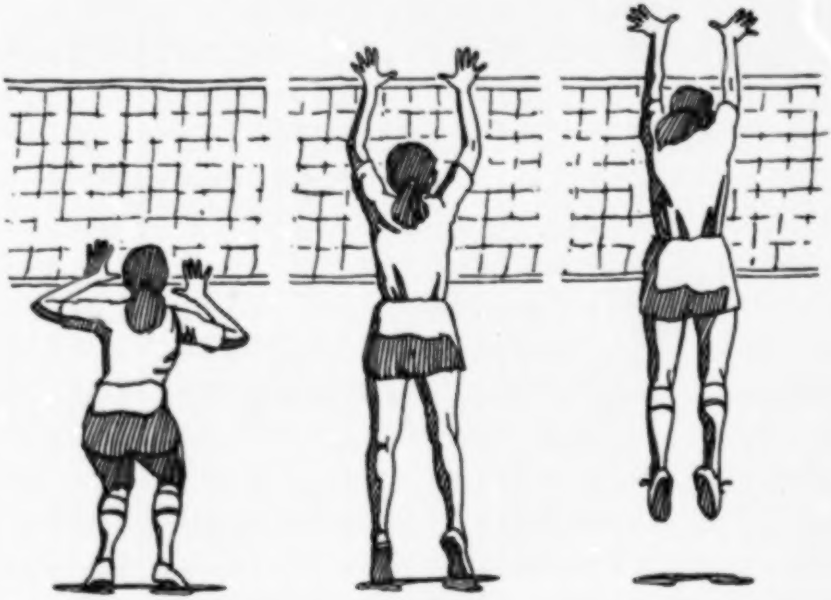


Figure 8. The Block



- Block three out of eight spikes off high sets.
- Jump and reach so that both hands are over the top of the net.
- Watch the spiker rather than the ball on every spike.

Safety Concerns

Volleyball is a relatively safe game to play. The only protective measure suggested is the use of kneepads. As in any sport, a sufficient warm-up before beginning activity is the best way to decrease muscle pulls. The legs and arms are used extensively and should be thoroughly warmed up before play. The best way to prevent collisions on the court is to communicate with teammates at all times, calling for the ball immediately upon deciding to play it.

When practicing skills and running drills in a fairly small area with a medium to large class, it is suggested that a signal be established to stop activity in case a stray ball is in danger of rolling under a jumping player's feet. When this signal is given, all activity should cease until the danger area has been corrected.

Competition

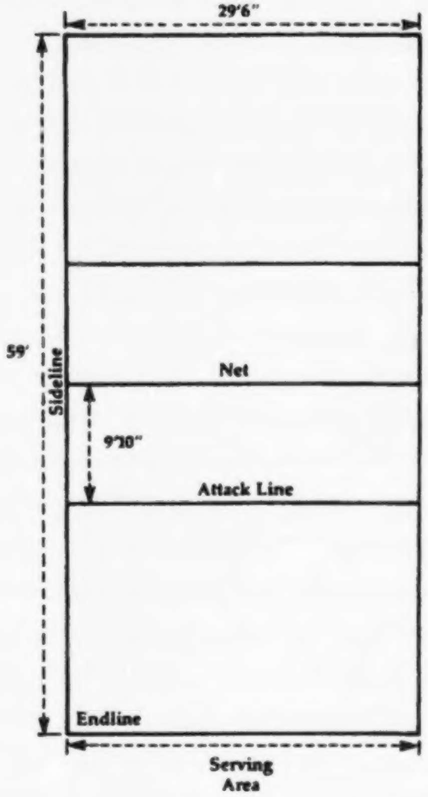
The court has several markings with which all players should be familiar. Diagram 5 illustrates a legal volleyball court and its markings.

The correct height of the net for women is 7' 4 $^{1}/_{8}$" (2.24 m), and for men 7' 11 $^{5}/_{8}$" (2.43 m). The court is 59' (18 m) long and 29' 6" (9 m) wide. The attack lines are 9' 10" (3 m) from the net. The serving area is outside the end line and along its entire length. Two small hash marks extend the sidelines and indicate the serving area.

A playing team is made up of six players. A squad can have no more than 12 players. Once the order of service has been established for a game, it cannot change until the game is completed. Players must be in their correct rotational position and on the court until the ball is contacted on any serve. At any other time in the game, players may play anywhere on their court or off it provided they remain on their own side of the net.

The game is started with a coin toss between the teams' captains. One captain calls the toss. The captain who wins the toss selects either to serve first, to receive first, or to play on a preferred side of the court. The other captain has the remaining choice.

Diagram 5. A Legal Volleyball Court with Its Markings and Measurments



Matches consist of either the best of three or of five games. There are currently two types of scoring used: side out scoring or rally scoring. In side out scoring, players can only score points when they are serving. If they receive and win the rally, they earn a side out and receive serve from their opponent. In rally scoring, when a team wins a rally it earns a point. If players receive serve and win the rally, they earn a point and the serve. In rally scoring, the team that wins each rally receives a point whether it has served or received. In side out scoring, each game consists of 15 points and a team must win by two. In rally scoring, the winning team is the first team to reach either 25 (USA Volleyball Rules) or 30 points (NAGWS Rules). The deciding game of a five-game match in rally scoring is played to 15 points. In all rally scoring games, the winner must have a two-point advantage. Rally scoring makes the game even faster and more exciting. The first serve

alternates with each game. A second coin toss is made for the third game or the fifth game—any game that will decide a match.

A player may not touch the net at any time while the ball is in play and close to the net. An inadvertent net touch when the ball is in the backcourt is not called because it has no effect on the outcome of the play. Any ball that contacts the net is legal and remains in play. If the ball is hit into the net with enough force to cause the net to hit a player, it is not a fault. If two opposing players hit the net or cross the centerline simultaneously, it is a double fault, and the point is replayed. Only forwards may block. Backs may not spike the ball from a position in front of the attack line. Players may leave the court in order to play the ball, but the ball must pass over the legal portion of the net to be good.

There are several ballhandling rules:

1. No player may hit the ball twice in a row unless the first contact is a block.
2. Each team may contact the ball three times on its side. If the first contact is a block, it doesn't count as a hit, and three additional contacts are allowed.
3. Part of the ball must be on a team's side of the net before that team may spike, but the team may block a ball before it crosses the net.
4. Each contact must give the ball immediate impetus. The ball may not be held, thrown, or carried.
5. The ball may be contacted with any part of the body, including the feet.

Players must be on the court during service (the line is part of the court). Players may touch the opponents' court on or over the centerline with one or both feet or one or both hands as long as part of the foot/feet or hands remains on or above the center line. NAGWS Rules allow the hands or feet to be completely across as long as there is no safety hazard or interference with the play of the opponents. It is a fault if any other part of the body contacts the floor on the opponent's court.

The ball is put in play from the service area. It must go over the legal portion of the net (the part between the antennas) and land within the boundaries of the opponent's court. If a serve touches the net and still goes over and is within the boundaries of the opponent's court, it is a legal serve and is referred to as a let serve. (The let serve is not legal in State Federation Rules). The lines of the court are inbounds. The serve must be contacted with one hand or arm. It must be cleanly hit after it has been released or thrown from the hand or hands of the server.

Tactics

There are basic court formations necessary for a team to be successful during competition. On offense, a team must have strategies for receiving serve, for receiving a free ball, and for covering a spiker. On defense, a team needs to have a base defensive formation and also a strategy for blocking.

Offense

With the basic skills of volleyball mastered, players can learn the offensive and defensive systems. The least complicated offensive system is the 4-2. Four players predominantly serve as spikers and two as setters. The setters are directly opposite each other in the lineup so that there is always one setter in the front line. The setter in the forward line performs the setting task. The other setter plays as a defensive player in the back row until rotating to the forward line and becoming the working setter.

There are three different formations used on offense. They are serve reception, spike coverage, and free ball. In all of these formations, the team is either receiving the ball from the opponent or playing it on their own side.

Serve Reception

Receiving the serve is extremely important. If a team cannot successfully receive the serve, they will never gain the opportunity to serve in side out scoring, and never have the chance to score themselves. Serve reception is a team effort.

The W-formation is the most common and most efficient formation for receiving the serve. In this formation, five players are ready to receive and one player, the setter, avoids receiving under any circumstances and "hides" at the net. Diagram 6 shows this formation, using H's to indicate the spikers and S's to indicate the setters. No player should stand behind a teammate, and all players must have a clear view of the opposing server. Each player on the court has certain responsibilities on serve reception. First, after the serve is hit, the players must determine who will receive it. The person receiving should call for the ball; then all remaining players should turn and face the

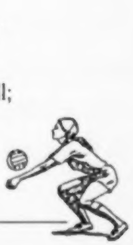


Diagram 6. The W-Formation Used for Serve Reception

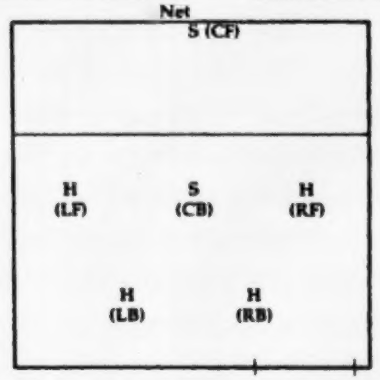


Diagram 7. W-Formation when the RF is the Setter: At ball contact by the server, the setter moves to the center of the court.

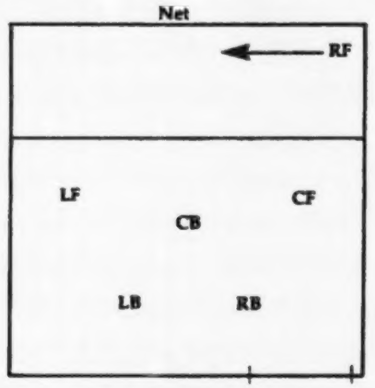
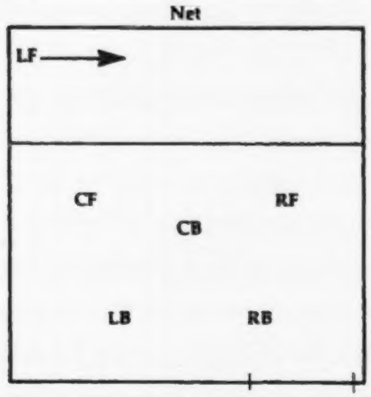


Diagram 8. W-Formation when the LF is the Setter: The CF must be ahead of the CB.



receiver. The action is called "opening up." Players should also help each other call the ball out over the sidelines and end lines. The RF and RB work as a team to call the right sideline. If the ball is being played by one, the other player judges the ball's position and calls it out if necessary. The LF and LB call the left sideline. The LB and RB are a team for calling the end line. The CF and CB should alert their teammates if a serve is short, i.e., if it is going to fall in front of the attack line.

In the waiting position for serve reception, all players should have their right foot forward in a slight stride. The setter standing near the net should not receive serve under any circumstances. Any ball shoulder height or higher as it approaches the forward line should be received by a back row player. Any serve shoulder height or higher as it approaches a back row player should be allowed to go out-of-bounds. The setter should always face the left sideline with his/her right side toward the net.

The sequence of action in receiving the serve should be as follows. The receiving player passes the ball to the setter at the net, who is facing the LF position. The setter then sets one of the two hitters, either forward to the LF or backward to the RF. As soon as the set is made, the entire team moves into spike coverage.

When the team rotates, the setter moves to the RF position. The setter must switch to the center of the court as the ball is contacted on the serve. Diagram 7 shows the W-formation when the setter is the RF. The setter hides at the net, and the CF moves toward the right sideline. The players who switch maintain their new positions until the next serve.

The next rotation finds the setter is the LF. Diagram 8 shows the W-formation and the switch when the setter is in the LF position. Once the ball is contacted, players may switch to any spot on the court. They should be careful, however, not to change positions with teammates until the ball has been served. When the setter switches to the center of the court, the center forward stays near the sideline and plays as an outside forward.

Spike Coverage

The purpose of covering the spike is to be ready to play the ball if the ball comes right back at the spiker off the opponent's block, usually falling behind the spiker. To cover this area behind the spiker, three players move to form a semicircle around the spiker, and the other two players move to fill the remaining

Diagram 9. Spike Coverage for the LF Spiker

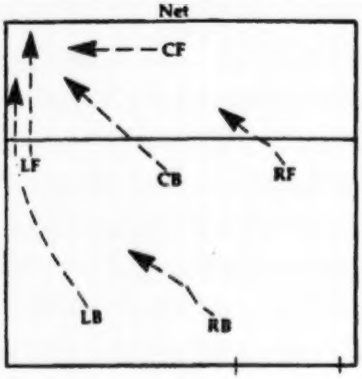
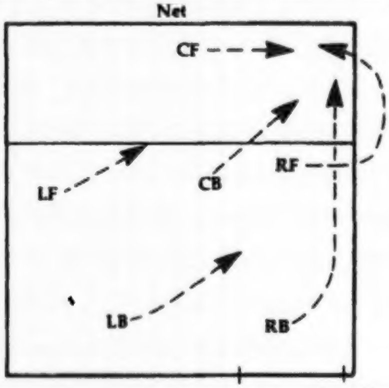


Diagram 10. Movement to Spike Coverage when the RF Is Spiking



spaces. All players must crouch low to have more time to react to the ball. Diagram 9 shows the movement of players when the LF is the spiker. Diagram 10 shows the movement of players when the RF is spiking. The center forward is customarily the setter and will only be called on to spike if there is a broken play.

Free Ball

When the opposing team is unable to set up for a spike, they will usually return the ball in a manner that makes it easy to handle—high and without force. This is called a free ball. When it appears that the opponents are in trouble, players should immediately assume the free ball formation. The free ball formation is the same as the W-formation except that the setter does not have to go to his/her correct rotational position and may remain in the center of the court. The team then proceeds as in serve reception, trying to get a three-hit combination pass, set, and spike.

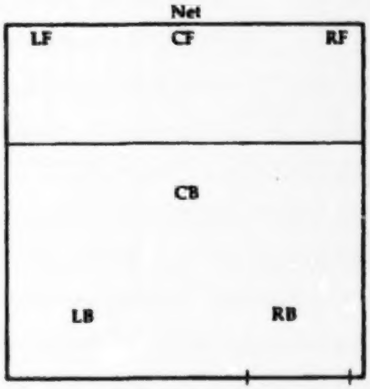
Defense

The best defensive system to use in beginning levels of play is the 2-1-3 defense. This defense is especially strong against a team with weak hitters or one that tips a good deal.

Base Defense

When the opponents are playing the ball, the team should be waiting in a base defensive formation. As the opponents attempt to set up a spike, all three forwards of the defensive team, anticipating that the first action will be a block, place themselves at the net in a blocking position. The center back stays in the center of the court, and the other backs stay deep. Diagram 11 illustrates the proper team alignment during base defense. From the base defensive formation, the team moves either into free ball formation if the opponents do not spike or into position to block when a spike occurs.

Diagram 11. Base Defense when Using the 2-1-3 Defensive System



The Block Defense

In this defense, two players form the block, one player plays close behind the block to provide tip coverage, and the remaining three players remain deep to dig spikes. As soon as the team knows from which side the opponents will spike, the CF moves to that side to form a double block with the outside forward. The CB moves behind the block and gets into a low position.

The remaining three players cover the rest of the court. The back on the same side as the block plays close to the line and is ready to dig a down-the-line spike. The forward not involved in the block moves off the net to the attack line and is ready to dig sharply angled spikes, play tips to the center of the court, and pick up any spikes that roll along the net and fall into the court.

The back opposite the block plays in the power alley. This is the part of the court where most of the spikes are likely to come. This player lines up off the inside shoulder of the center forward so that the player sees the spiker's hand and the ball. Diagrams 12 and 13 show the proper court positions for all players when the opposing right forward and left forward are spiking. The shaded area indicates the power alley. The area deep behind the block tends to be the weak area in this defense.

Diagram 12. The Proper Court Coverage when Using the 2-1-3 Defense and the Opposing Right Forward is Spiking

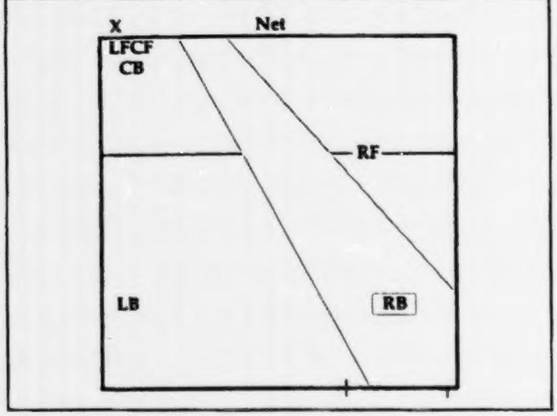
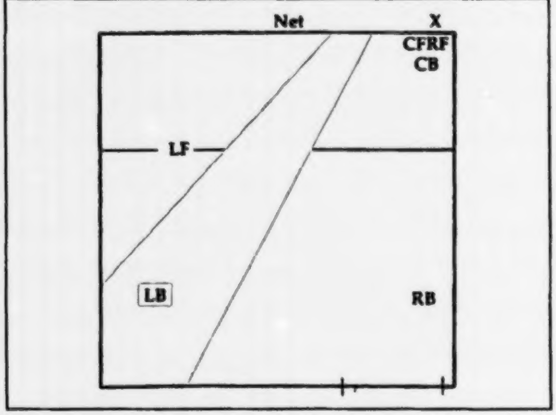


Diagram 13. The Proper Court Coverage when Using the 2-1-3 Defense and the Opposing Left Forward is Spiking



In the beginning levels of play, few teams will spike from the CF position unless they are playing an international 4-2 offense, where the setter sets from the RF position. If a spike is made from this position, it is suggested that the defending team use only one block.

Equipment

The best volleyball is made of leather with molded seams. It is softer to the touch and does not hurt the arms when played. A good volleyball will cost at least $35.

Net standards that fit into a sleeve in the floor are the safest. Nets that have a tensile rope for the upper cable are easiest to use and store. Using this type of equipment makes it easy to obtain the correct net height and tension. For competitive matches, antennae and an official's stand are required. The official's stand must be padded according to the specifications of the rules being used. High schools play under the rules published by the National Federation of State High School Associations. It is a good idea to check the rules of the appropriate governing body before ordering equipment.

Shorts and shirts are proper attire for uniforms. Many players enjoy wearing spandex shorts because of their comfort. Materials that breathe are preferred to keep the players cool.

Resources for Continued Participation

After learning how to play volleyball, you will probably be interested in continuing to compete in the sport. There are many ways that you can do this. Most schools sponsor teams at the middle school and high school levels. Look for announcements for tryouts. Volleyball is a fall sport in most areas, so tryouts will take place before school begins in the fall. USA Volleyball sponsors junior competitions at levels beginning with 10 and under and continuing until age 18. Local clubs sponsor teams that compete in tournaments from January through July. Clubs usually begin their tryouts at the end of the high school season in November of each year. The volleyball coach at your high school or your physical education teacher should be able to direct you to these clubs. If you do not want to compete at that level, local recreation departments usually sponsor leagues you can join. Call your town or county recreation department for more information. Many colleges and universities sponsor camps during the summer. These are two to five days in length and provide instruction and practice at a fairly intense level. Local recreation departments and YMCAs also provide instructional programs. The Internet is a good source for finding the camp closest to you. Your physical education teacher and/or coach can help you find the program that best suits your needs.

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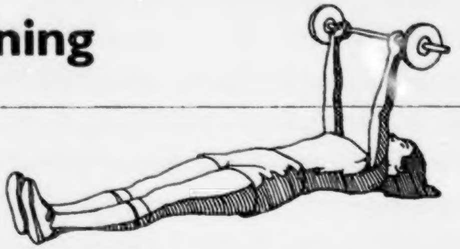
CHAPTER 26

Weight Training



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Introduction

Strength-training activities have been reported in many cultures from the beginning of recorded history. Ideas, methods, and philosophies for increasing strength developed from the necessity of having strength in all human activities. The need for muscle strength continues today more than ever, and weight training continues to gain in popularity as a means to increase strength. The many forms of resistance training allow persons of each age and gender to experience the benefits of added strength.

The current popularity has not always been accepted by coaches, who discouraged weight training in the past. Fears of skill loss, flexibility loss, or even power loss were reported in the nonscientific literature of the 1930s, 40s, and 50s. However, with the increasing scientific research of these decades, it soon became clear that the myths of the past were not supported and that weight training was an important element in any conditioning or sport-training program. Today, a fitness or sport-training program without weight training would be seriously lacking. Several of the most prestigious organizations concerned with conditioning for fitness or sports support having weight training included in the program. These organizations are the (1) The American College of Sports Medicine (ACSM), (2) The American Association of Health, Physical Education, Recreation and Dance (AAHPERD), and (3) The Cooper Institute located in Dallas, Texas.

There are three means of improving sports ability: improving skill, improving strategy, and improving strength. Strength is considered the component necessary to complete the fitness program along with cardiorespiratory fitness, flexibility, body composition, and muscle endurance. This chapter will focus on the various types of resistance training for improvement of strength.

The term *resistance training* is used in this chapter to define all exercise programs that are used to increase strength. Other terms are used in the literature, but resistance training is the term used most often in the latest literature.

The types of exercises included under the heading of resistance training in this chapter are as follows: free weights, weight machines, elastic bands, spring exercises, and partner-assisted exercises. Each of these exercise forms is defined in the terminology section.

Terminology

Free Weights. Objects such as barbells, weight plates, and dumbbells used for physical conditioning and competitive lifting.

Weight Machines. Single- or multipurpose machines designed to simulate free-weight exercises.

Elastic Bands. Bands made of rubber that come in different sizes and tensions to be used as a resistance for many exercises.

Springs. Springs that can be used for resistance. These usually come designed to add or take off springs to adjust the tension for different loads.

Partner-Assisted Exercises. Exercises using a partner to apply resistance simulating free weights.

Repetitions (Reps). The amount of times a weight is lifted before the lifter stops to rest.

Sets. The number of repetitions consecutively performed in an exercise without resting.

Olympic Lifting. Competitive lifting involving

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two lifts: the clean and jerk, where the bar is lifted to the shoulder and then pressed to a straight arm position overhead, and the snatch, where the bar is lifted from the floor to a straight-arm position in one movement.

Power Lifting. Competitive lifting involving three lifts: the squat, bench press, and dead lift

Weight Training. Exercises performed using free weights, machines, or other forms of resistance for the purpose of increasing strength, muscular endurance, and muscle size to become better at a chosen sport or to look better.

Range of Motion. The amount of movement available around a joint.

Load. Amount of weight lifted per repetition.

Who Should Participate

Everyone should participate in strength training. Most people wish for more strength every day to accomplish some task. Specific reasons to participate in resistance training are (1) to build general strength for joint stability, to build muscle padding for bone protection, and to look better; (2) to compete in Olympic lifting, power lifting, and bodybuilding; (3) for athletes to add strength to be better when participating in their sport; and (4) for rehabilitation after injury or surgery.

Weight Control

Muscles consume calories and fat does not; therefore, the more muscles you have, the more calories you burn. This can aid in weight control to a small degree, but resistance training should not be used as a weight control method. Muscle is much more dense than fat and takes up less space per pound; therefore, two people who weigh the same can have a marked difference in appearance and the size of clothes they wear.

Physical Fitness

Physical fitness has been a national concern for decades, and one of the primary components of fitness is strength. Resistance training is the best activity for strength improvement. Women, men, children, and older adults can all improve their fitness through resistance training.

Benefits of Resistance Training

The main benefit of resistance-training activity should be an increase in strength for the participant. A well-designed program of systematic, progressively planned activities will guarantee strength gains. A few of the many additional benefits of resistance training are listed below:

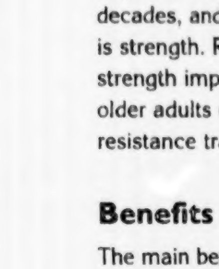
1. Feeling better
2. Improved body image and a more attractive appearance
3. Better efficiency in work and play, e.g., lifting luggage, moving furniture, and playing games and sports
4. Better health
    a. Bone loss prevention
    b. Muscular strength for daily tasks
    c. Stress and tension release
5. Competition
    a. Self-testing
    b. Training with friends
    c. Enter a meet
    d. Compare with last year's record
6. Physical fitness changes
    a. Muscular endurance
    b. Body composition
    c. Flexibility
    d. Speed of movement

None of these benefits is assured, but they can be accomplished with a well-designed program. The myths that weight training will result in muscle-boundness, bulky muscles in women, loss of flexibility, slower speed of movement, loss of coordination, etc., have been well refuted by research. Drugs and special diets are not necessary for maximum strength development. Research continues to show the deleterious effects of drugs used for strength enhancement, and that a well-balanced diet, without illegal supplements, is all that is needed for great benefits to occur.

Safety

Lifting Fundamentals

Correctly performing basic lifting skills avoids placing excessive stress on muscles, tendons, ligaments, bones, and joints, thus decreasing the likelihood of injury. Proper breathing helps avoid dizziness or blackouts, which can lead to life-threatening circumstances. The fundamentals learned here can be applied to all exercises and spotting procedures described in this



chapter. While you are learning these basic lifting and spotting skills, always use a dowel stick, a light bar, or a light load selection on machines.

Correct Lifting Techniques

The techniques of lifting involve focusing on four things: (a) having a good grip, (b) having a stable position from which to lift, (c) keeping the object being lifted close to the body, and (d) using your legs, not your back, when lifting bars off the floor.

Correct Spotting Techniques

1. Give the lifter your undivided attention during the exercise
2. Stand as close as you can without interfering with the exercise
3. Position yourself in the strongest position to assist if needed

Weight Room Rules

1. Never leave weights or dumbbells on the floor to trip over.
2. Unload a bar before going to the next exercise.
3. Have a towel to wipe perspiration from the machine.
4. Always have a spotter when the weight is over your head or chest or on your back (squat).
5. Frequently check the condition of the cables, pulleys, and free-weight bars.
6. No horseplay.
7. No small children in the area.
8. No chewing gum or eating while lifting.
9. Wear appropriate clothes while lifting.
10. Always wear shoes.
11. Use strict form and proper technique.
12. Have an area set aside, out of the mainstream, for Olympic lifting or power lifting.
13. Use locks on all plate-holding equipment.
14. Respect the rights of others in the weight room.

How to Start a Resistance Training Program

What to Wear

Exercise wear for resistance training is the same as for other exercise and sport activity. Clothing should be lightweight, provide freedom of movement, and collect sweat adequately. Clothing that is too loose or too tight can cause problems. The clothing should cover the body so that sweat is not a problem for persons using equipment after your use. Shirts, shorts, socks, and shoes should be worn for safety and cleanliness. The shoes can be weight lifting shoes or athletic shoes. If competitive lifting is the objective, lifting shoes are recommended. A sports bra for women can be helpful, and a lifting belt for both men and women can be especially helpful for handling heavy weights. Gloves are used by many to protect the hands during long workouts.

Where to Exercise

Many private and public gyms are available for a fee. Selecting the gym for a personal program can be a problem. The fee is one consideration; the cleanliness, the amount and type of equipment, the number of persons using the gym, and the location are also factors to consider in selecting a gym.

Home exercise is another consideration. Several equipment companies manufacture home equipment. If one wishes to buy equipment for the home, seeking the advice of a trusted expert is essential. The possibility of buying poorly designed or constructed equipment with little durability is great.

Starting an Exercise Program

It is important to understand what is to be accomplished through the conditioning program before a systematic program can be developed to achieve these ends. It is also important to understand how resistance training serves as an effective conditioning tool. The following qualities become highly developed through resistance training.

1. Muscular power—the ability to move a weight in a short period of time.
2. Muscular strength—the capacity of a muscle to exert maximally one time.
3. Muscular endurance—the capacity of the muscle to contract repeatedly over a period of time. This is a local muscle characteristic.

Any or all types of exercises—isometric, isokinetic, elastic cord, spring, or partner-assisted exercises—can be used in resistance-training programs. Each one of these methods of exercise has positive and negative attributes. Selecting the exercise that meets the economic, time, developmental, and personal needs of the individual is a part of choosing an exercise program.

Isotonic exercises are done both concentrically and eccentrically. A concentric contraction is when the muscle shortens against the resistance. An eccentric contraction is when the muscle lengthens as it exerts force against the resistance.

Isokinetic exercises are similar to isotonic exercises. The difference is that the movement is completed at a constant speed and allows for maximal contraction throughout the range of motion for the exercise. The speed of movement remains the same, more or less, regardless of the force being applied.

Isometric exercises are excellent rehabilitation exercises because the exercises can be done with the amount of resistance supplied by the exerciser. No movement is made, but the exerciser simply exerts force against a fixed object at the maximum resistance he/she can exert.

Workout Program

The elements of the workout are (1) the warm-up, (2) the exercise, and (3) the cooldown.

Warm-up

Some still advocate the use of a total body warm-up by jogging, stepping, etc., for 5-8 minutes or until light perspiration begins. However, it is generally accepted in resistance training circles and the National Strength and Conditioning Association that warming up with a light weight to perform the same movement you are about to perform with a heavier weight is the preferred method. Also, stretching should be done after the workout on each area. An example would be to do the warm-up activities for a bench press, do the bench press, and then stretch the chest, anterior deltoids, and triceps before going to the next body part.

Exercise Program

The first step in developing a total body exercise program is careful planning; during this time, the correct technique should be learned and muscular endurance improved. In the beginning, it is recommended that you do a total body workout three days a week, with a day between each workout, e.g., Monday, Wednesday, and Friday. Later in the program, after learning technique and having acquired a degree of conditioning, consider doing a split routine and adding the fourth day. By doing this, you can increase your rate of improvement. By only doing half your body each workout, you can greatly increase your intensity, which produces faster strength gains. An example would be to focus on the lower body on Monday and Thursday and the upper body on Tuesday and Friday. Exercises for each area of the body are then selected. For a complete workout, exercises should be chosen to affect the following:

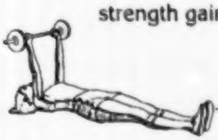
1. Neck
2. Shoulders
3. Chest
4. Upper Back
5. Upper Arms (Biceps and Triceps)
6. Forearms
7. Abdominals
8. Lower Back
9. Gluteal
10. Quadriceps
11. Hamstrings
12. Calves

Repetitions (Reps) and Sets

Repetitions are the number of times you lift a weight without stopping for a rest, and sets are the number of times you perform the repetitions. For example, if you perform 10 bicep curls and stop, this equals 1 set. If you perform this three times, you have performed 3 sets of 10 reps. Another way this is identified, to be entered in your workout sheet, is to also give the amount of weight in the entry. For example, 3 sets of 10 reps with 25 pounds becomes 3x10x25.

Exercises for each of these body areas are found in the final section of this chapter. Selection of the exercises for each individual, to meet the individual needs mentioned above, is the next step in starting a program.

The progressive resistance method should be followed. This means that to increase strength, the load on the muscles should be increased as they adapt to the present load. This added stress of overload causes the muscles to adapt by becoming larger, more efficient, and stronger. After learning correct technique and safety, a person needs to decide what he or she wants from the program: (1) strength, (2) strength and muscular endurance, or (3) muscular endurance. If you want to gain a lot of strength, you should use enough resistance so that you can only do 3 to 5 repetitions for 5 to 7 sets, which includes warm-up sets. For strength and endurance, you should use enough resistance that you can do between 5 and 8 reps for 5 to 7 sets, and for muscular endurance, you should have enough



resistance so you can do 12 to 20 reps for 5 to 7 sets. When you perform the exercises mentioned, you should continue until you experience failure in the exercising muscle. If you can do more than 20 reps, you should increase the resistance in the endurance phase until the reps to failure are less than 20 but at least 12 or more. The same is true for strength, and strength and endurance.

Proper Grip, Spotting and Breathing

It is very important that the weight trainer have a good understanding of proper grip, spotting techniques, and breathing.

Grips

The grip depends primarily on the exercise being performed. Three major grips are used in weight training: overhand (palms forward or down away from the lifter), underhand (palms up or turned toward the lifter), and mixed (a combination of the first two grips, with one hand turned one way and the other the opposite way) (Figure 1).

Spotting

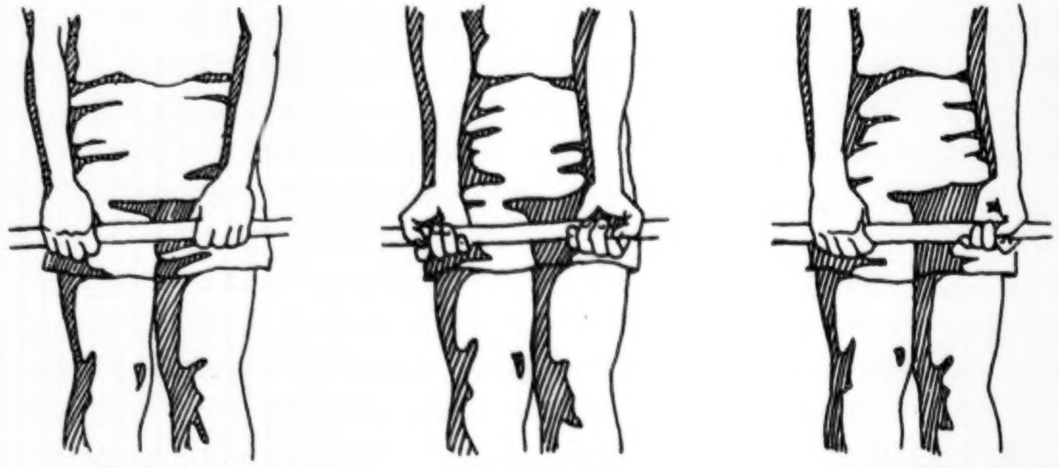
Spotting is a preventive safety measure and is very important while lifting weights that are above a lifter or could cause injury if the lifter cannot do the lift. Many dangerous situations can be avoided by following proper spotting principles. Spotters are people who stand close to the lifter to provide assistance when needed. They may help position a heavy weight for the start of an exercise or help remove it after the lift. Their primary function, however, is to prevent injuries by controlling the weight in the event of a slip or if the lifter cannot complete a lift. Some helpful principles of spotting are given below:

1. Properly use and inspect equipment.
2. Give 100% attention when spotting.
3. Use at least two spotters when working with very heavy weights.
4. Use appropriate lifting racks when lifting very heavy weights.

Breathing

Proper breathing is one of the important requirements in resistance training. Many weight trainers do not practice correct breathing techniques, which limits their performance and could be dangerous. If the exercise weights are light to medium, breathing can easily follow the pattern of breathing out on exertion and breathing in as the action returns the bar to the starting position. The light to medium breathing keeps the internal body pressure at a comfortable exercise level. The lifting of heavy weights, however, demands that the lifter stabilize the trunk to provide a firm foundation for the execution of the exercises. Therefore, the air is taken in prior to the lift and held during the exertion. However, a forceful exhalation does help in making close lifts and also reduces the possibility of passing out.

Figure 1. The Grips.



a. Overhand grip.

b. Underhand grip.

c. Mixed grip.

Weight Training Exercises

Neck

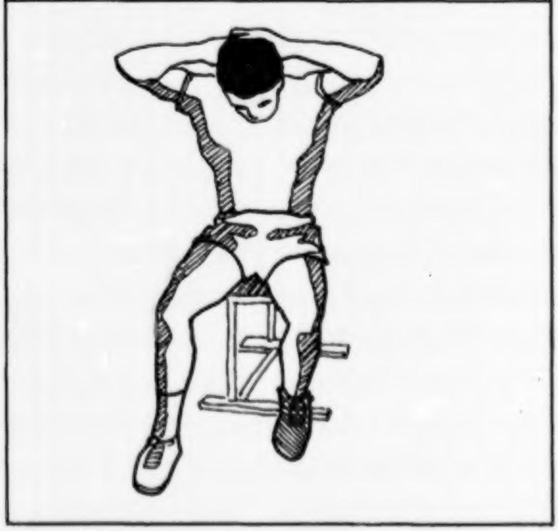
The neck is a very important and sensitive area to exercise and should be trusted to no one but yourself or a trained professional. Partner-assisted neck exercises are a dangerous way of exercising this important area. In many gyms, the four-way neck machine is available and should be used if possible.

Extension and flexion

This exercise can be accomplished by providing your own resistance, using your hands, a towel, jump rope, rubber tubing, etc.

1. *Neck extension*: Clasp your hands or hold a towel behind your head and press forward providing resistance. The head starts from a flexed position (chin on chest) and pulls back to an extended (straight and aligned with spine or slightly past) position. If this causes a tingle down the arms or pain anywhere, you are going too far. Repeat until the neck muscles become slightly fatigued (Figure 2).
2. *Neck flexion*: Starting from a straight or slightly extended position, place your palms against your forehead and press forward until the chin is on, or close to the chest. Repeat until fatigued (Figure 3).

Figure 2. Neck Extension



3. *Lateral flexion*: Neck flexion is head movement toward the right or left shoulder. Place your palm above your ear and provide resistance toward either the right or left shoulder. Exercise both sides until slightly fatigued (Figure 4).

Figure 3. Neck Flexion

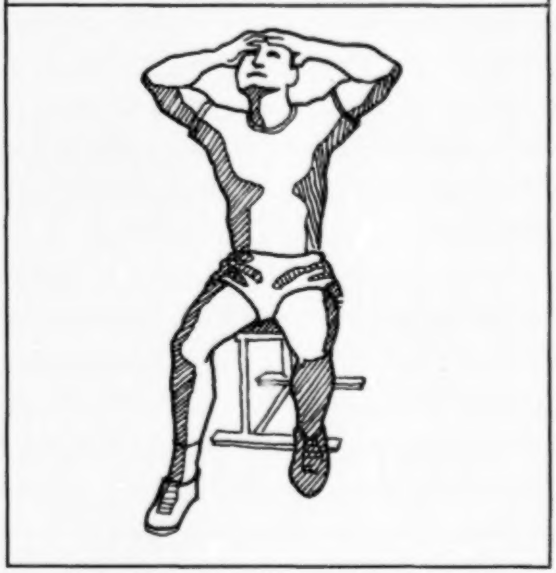
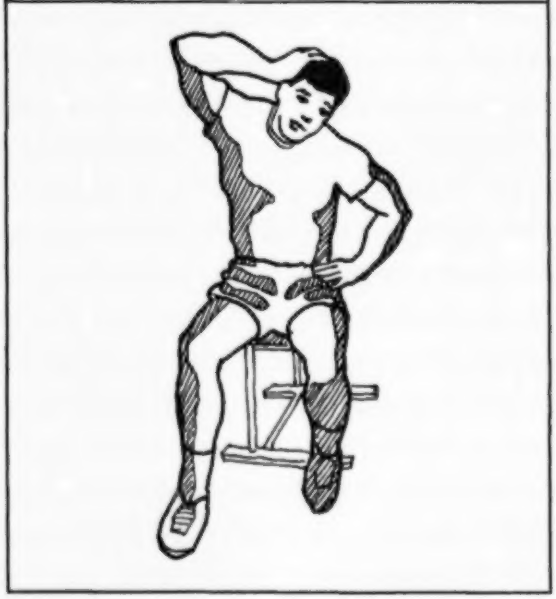


Figure 4. Lateral Flexion



4. *Shrug (shoulder shrug)*: This exercise is usually thought of as a shoulder exercise, but the muscles of the neck and upper back are the exercising muscles—the shoulders just go along for the ride. Start either without weight or use a light weight. If you are using weights, have one in each hand and lift the shoulders upward as high as possible and then lower slowly back to the starting position. Repeat until fatigued (Figure 5).

Shoulders

The shoulder muscles are the deltoids (anterior, middle, and posterior) and rotator cuff.

1. **Shoulder Press**: This can be done either standing or seated. The exercise starts at shoulder height and then the arms are pressed upward until straight above the head. A weight bar or dumbbells can be used; both are effective (Figure 6).

Figure 5. Shoulder Shrug

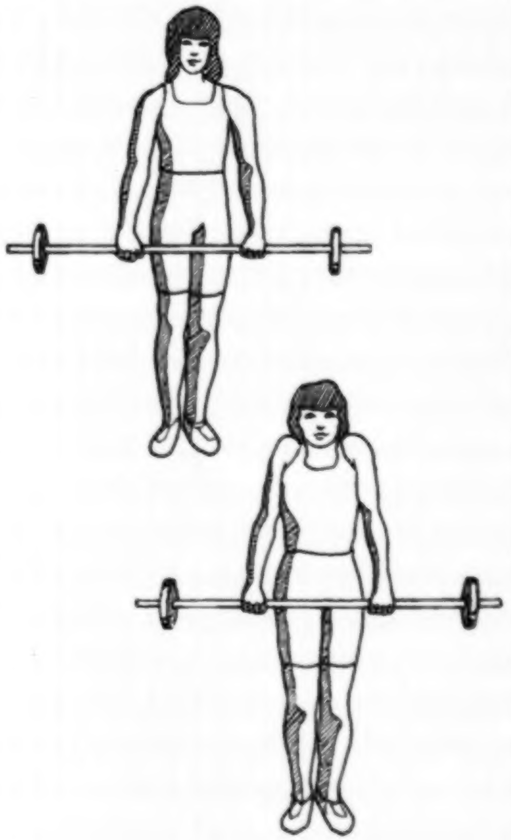
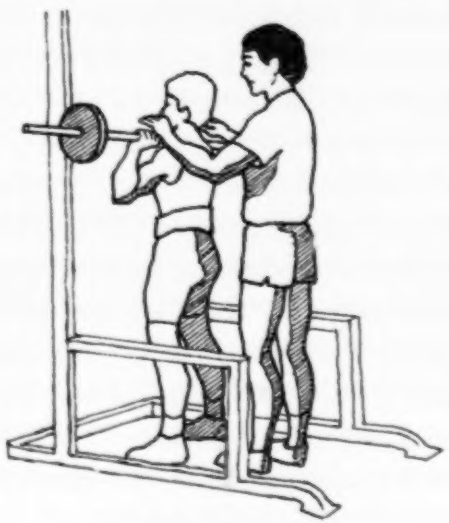
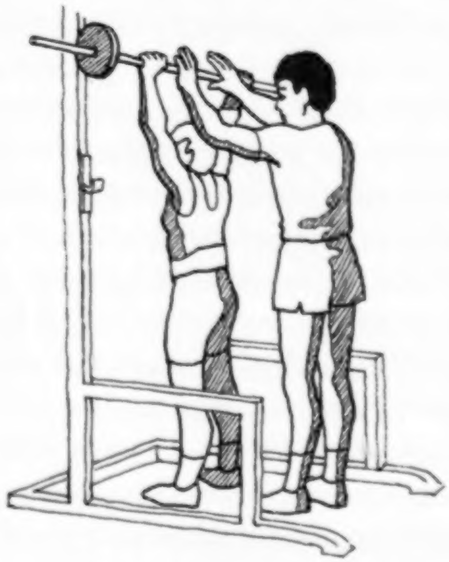


Figure 6. Shoulder Press

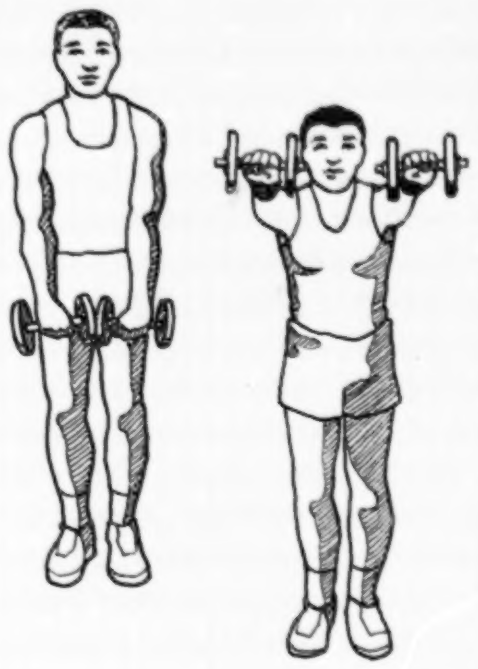


a. Preparation Phase



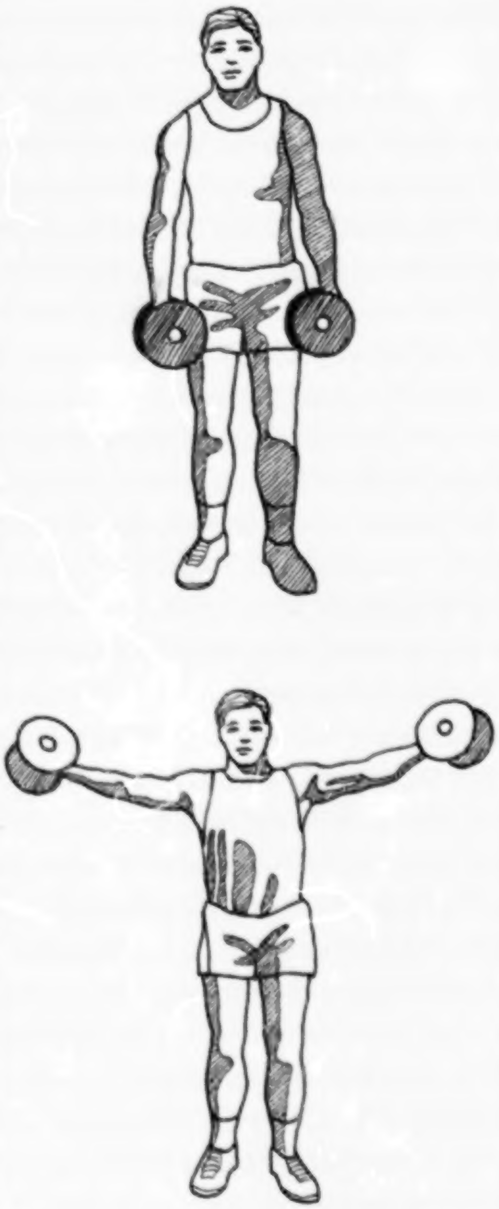
b. Upward Execution Phase

Figure 7. Dumbell Raise: Front



2. **Dumbbell Raises**: If a lifter wishes to concentrate on the front, middle, or posterior deltoid, the lifter should do dumbbell raises (Figures 7, 8, 9).
   a. *Front*: Hold a weight in each hand and, with knuckles up and arms straight, lift the weight to shoulder height directly in front of you and then lower it slowly back to the starting position (Figure 7).
   b. *Middle*: Hold a weight in each hand at your side and, with knuckles up and arms straight, lift the arms outward to each side until the weight is shoulder height and then slowly lower it back to your side (Figure 8).
   c. *Rear*: In order to force the rear deltoids to work, the lifter should bend forward slightly at the waist and bend the knees slightly to reduce stress on the lower back. Hold a weight in each hand, with knuckles up and arms slightly bent, and lift as high as you can. Then lower the weights slowly back to the starting position (Figure 9).
   d. *Upright Rowing*: Take either a curved bar or straight bar and place your hands about

Figure 8. Dumbell Raise: Middle



five inches apart, with your knuckles up. Then begin to raise the bar, keeping it close to the body and keeping the elbows higher than the wrists at all times. Continue until the bar approaches the chin; then pause and slowly lower it, back to an extended-arm position (Figure 10).

e. *Rotator Cuff*: Although the literature describes several ways of using weights to exercise these muscles, I prefer using rubber tubing or bands made especially for this exercise. This is easily performed by tying the tubing to a secure object and standing with your side to the attached tubing. In this position, place

Figure 9. Dumbell Raise: Rear

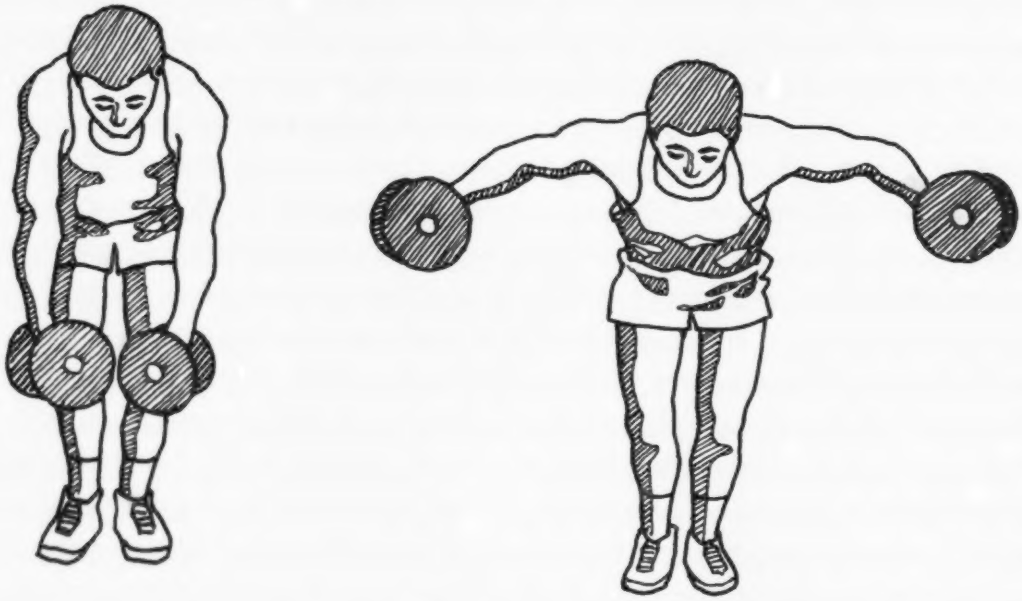
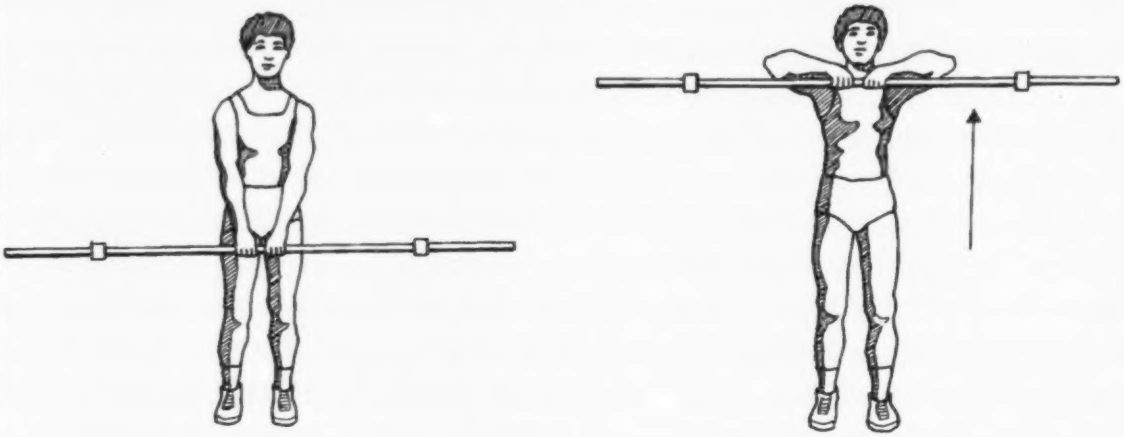


Figure 10. Upright Rowing



the elbow against the ribs, pull across your abdomen, and return. Then turn the opposite side to the attachment, place the elbow against the ribs, and pull outward, away from the abdomen (Figure 11).

Chest

The chest muscles are the pectoralis major and pectoralis minor. Additional muscles used in doing a bench press or chest press are the anterior deltoids and triceps.

Bench Press

The bench press is the most popular exercise of all weight-training exercises. When you mention that you lift weights, "How much can you bench?" is usually the first question. Beginning lifters will often do bench presses and neglect other parts of the body unless they are encouraged to exercise the entire body for equal development of all the body parts. The bench press is divided into three phases: preparation, downward, and upward (Figures 12, 13, 14).

Always use a spotter while doing this exercise.

1. *Preparation*: Lie on the bench with four points of contact: head, shoulders, and buttocks on the bench, and the feet on the floor. You should take an overhand grip with your thumbs around the bar, shoulder width apart. Have your spotter help remove the bar until it is in a straight-arm position over the chest.

Figure 11. Rotator Pull

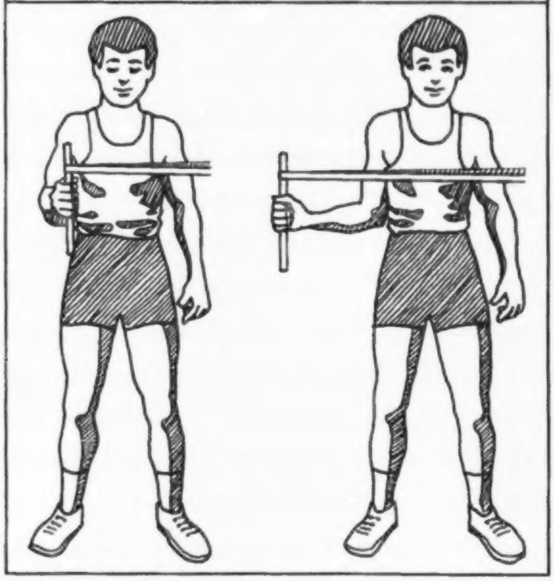


Figure 12. Bench Press, Preparation Phase

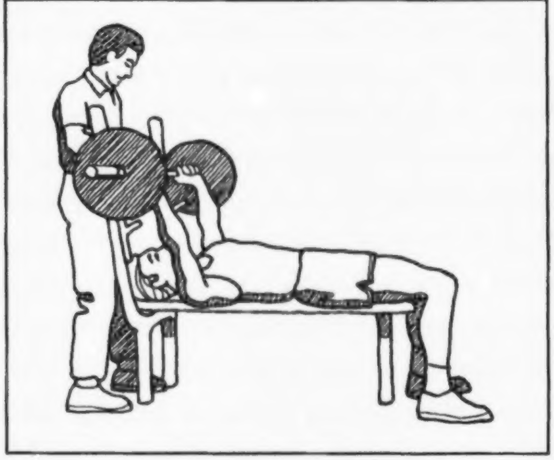


Figure 13. Bench Press, Downward Execution Phase

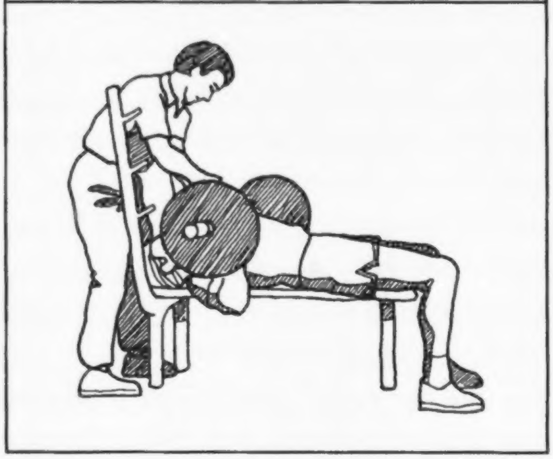


Figure 14. Bench Press, Upward Execution Phase

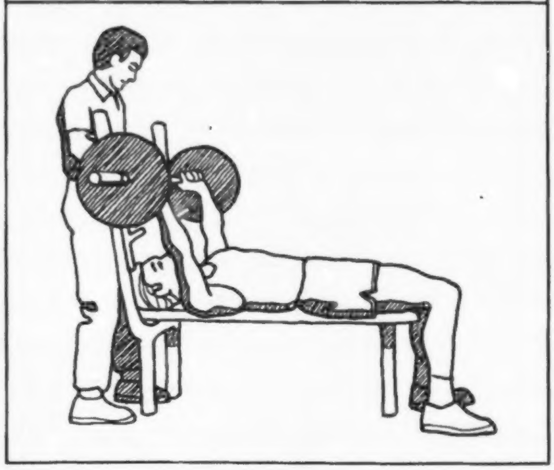
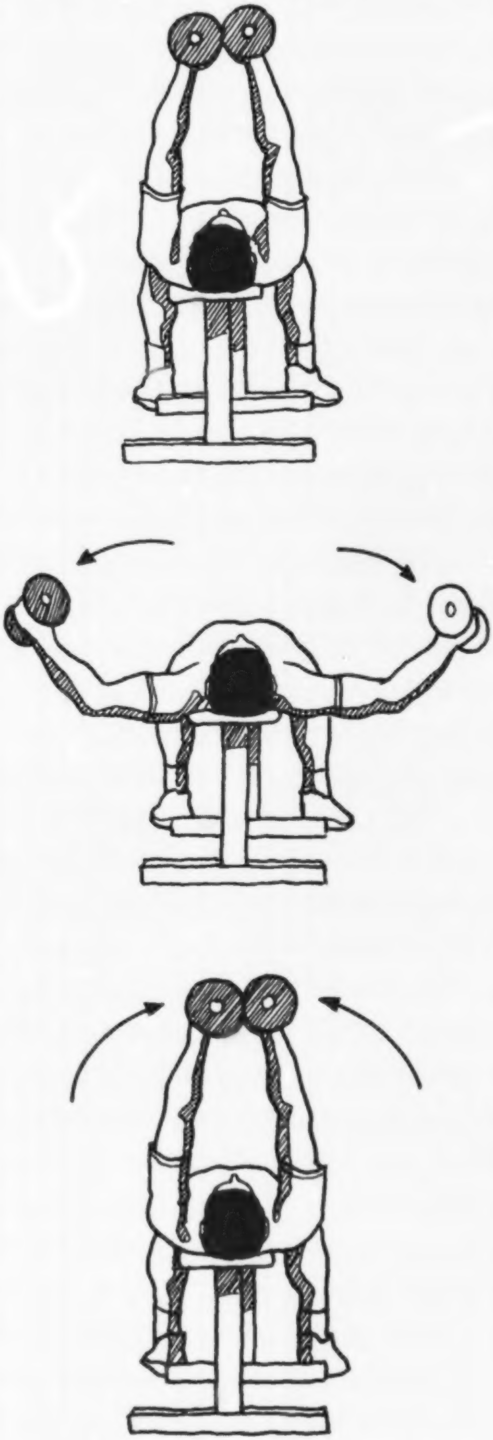


Figure 15. Dumbell Fly



2. *Downward*: Keep your wrists straight and inhale while slowly lowering the bar to the chest at nipple level; pause as the bar touches the chest.
3. *Upward*: Exhale while pushing the bar evenly upward and pause at the straight-elbow position. Continue until the desired number of reps is completed.

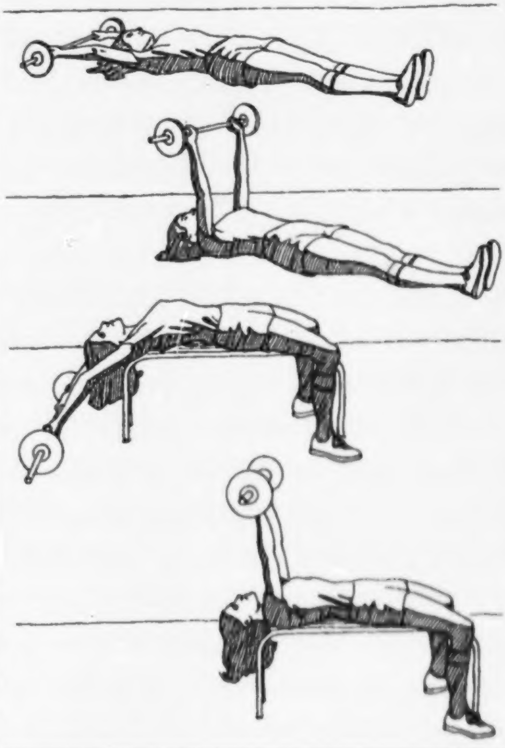
Dumbbell Flys

Take the same position on the bench as for a bench press. Take a dumbbell in each hand and position them, palms facing inward, directly over your chest. Bend the elbows slightly, keeping them in the same position throughout the exercise. Begin to lower the weights until they are approximately even with your chest; then return to the starting position over your chest (Figure 15).

Pullovers

Most companies make a pullover machine that is simple to use, but if none is available, a bench press bench and barbell will give the same results. Assume the position shown in Figure 16 and allow the weight to move back and down behind your head until you feel

Figure 16. The Pull-Over



a stretch in the chest area. Return the weight to the starting position and repeat for the desired number of reps.

Upper Arms (Biceps and Triceps)

Biceps Curl

Many companies make some version of a biceps machine that is safe and easy to use. However, if you only have free weights, you can still get a good workout and a more realistic movement than with a machine. Load the bar lightly at first until you can pull the weight easily and then begin to increase the weight. Use the following rules (Figure 17):

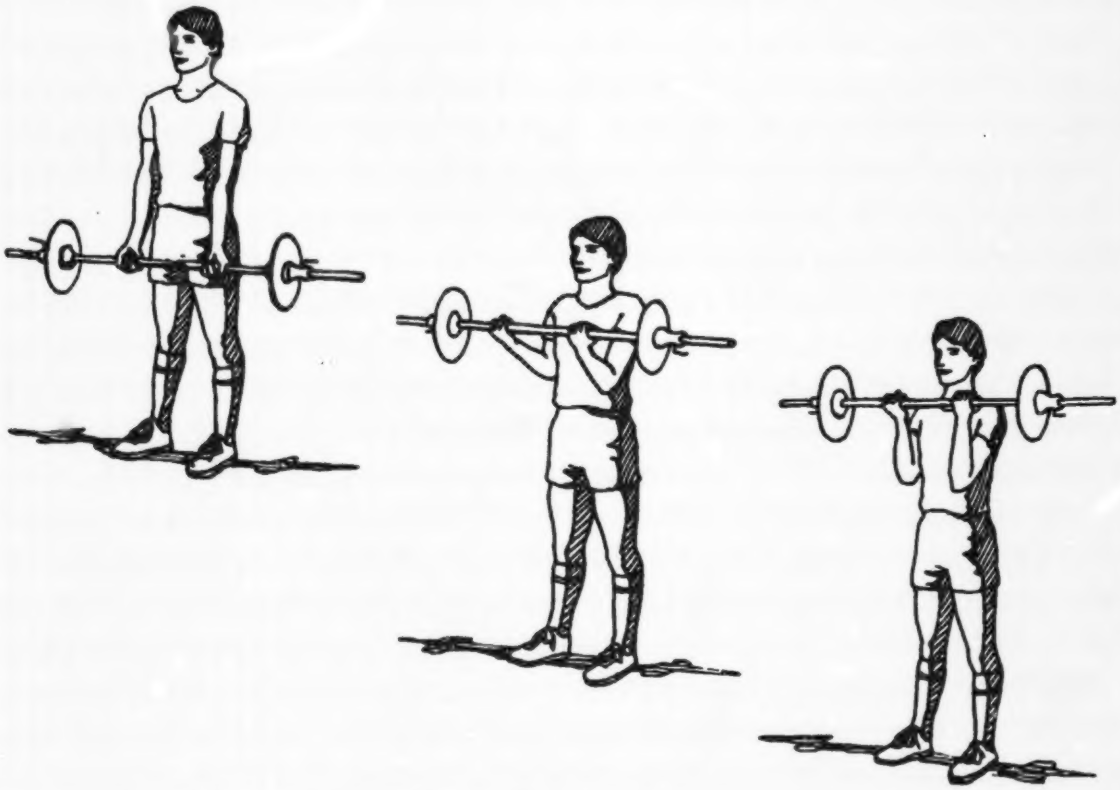
1. Stand erect with your knees slightly bent.
2. Grasp the bar in an underhand grip, alternating a narrow and wide grip.
3. Press your elbows against your ribs throughout the exercise.
4. Start with the bar against your thighs.
5. Pull upward until the bar nears your chin—exhale.
6. Slowly lower the bar until it touches your thighs—inhale.
7. Repeat until the desired number of reps is completed.
8. This exercise can also be performed using dumbbells.

Triceps Extension

Easy-to-use machines to exercise the triceps are also available in most gyms and fitness centers. However, there are many free-weight exercises to build the triceps.

1. Stand with your knees slightly bent (Figure 18).
2. Grasp the bar in an overhand grip, using a narrow grip (Figure18).
3. Push bar overhead to a straight-arm position (Figure 18).
4. Slowly lower the bar to the back of your neck, keeping your elbows pointed straight up, and return to the starting position (Figure 19).

Figure 17. Biceps Curl



5. Repeat for the desired number of reps.
6. Have a spotter available in case you can't get the bar off your neck.

Figure 18. Triceps Extension, Preparation Phase

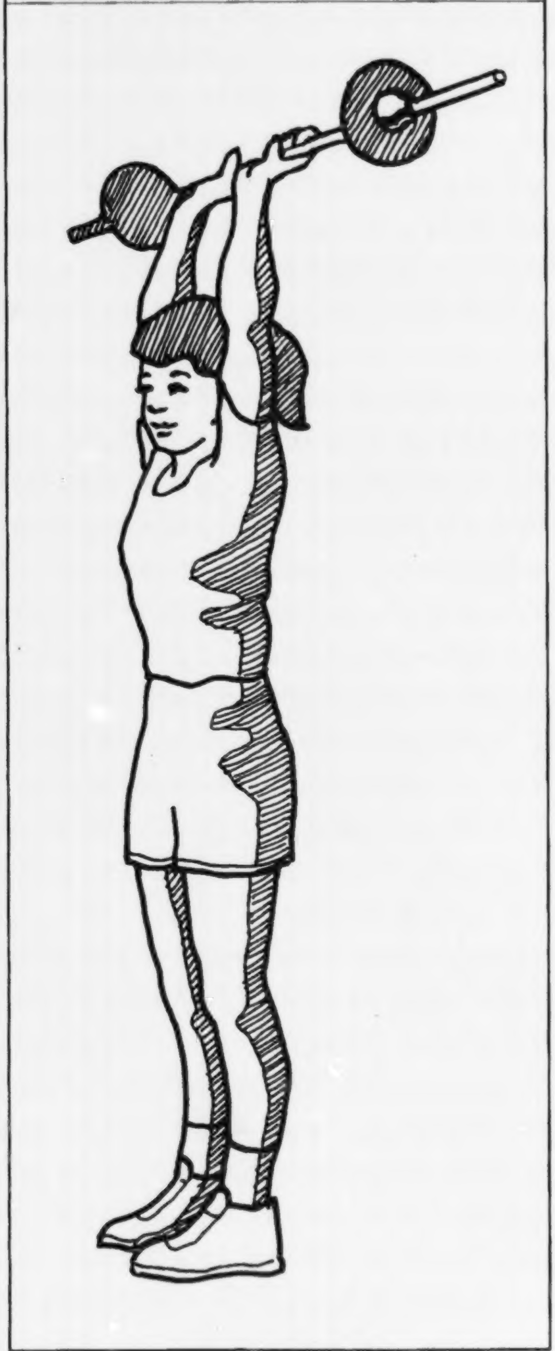
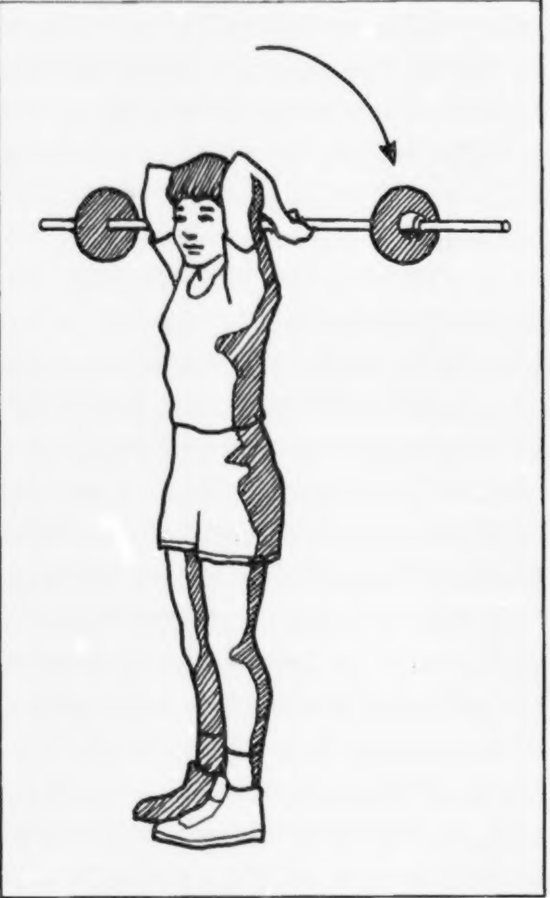
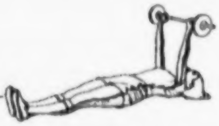


Figure 19. Triceps Extension, Execution Phase



If flexibility is a problem for getting your elbows in the correct position above your head, use a supine (face up) position on a bench. Position your head at the end of the bench and have a spotter hand you the bar in a straight-arm position and a narrow grip. Lower the bar slowly to your forehead, with your elbows pointed straight up. Then return the bar to the starting position (Figure 20).



You can also use a dumbbell for a **triceps kickback** (Figures 21 and 22). Do not use momentum to complete the exercise. From a hanging position, slowly press the dumbbell to a straight-arm position; without moving the upper arm, slowly lower the weight back to the hanging position and repeat.

Forearms (Lower Arms)

The forearms are often neglected and should be exercised regularly. The exercises described here are the forearm flexion, extension, supination, and pronation.

Figure 20. Supine Triceps Extension

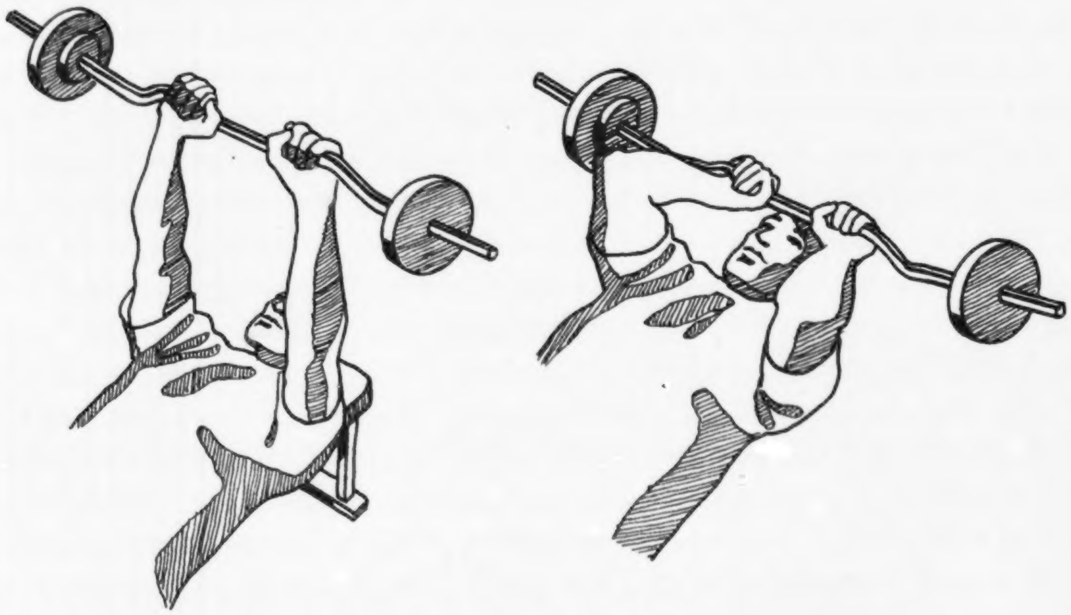


Figure 21. Triceps Kickback Starting Position

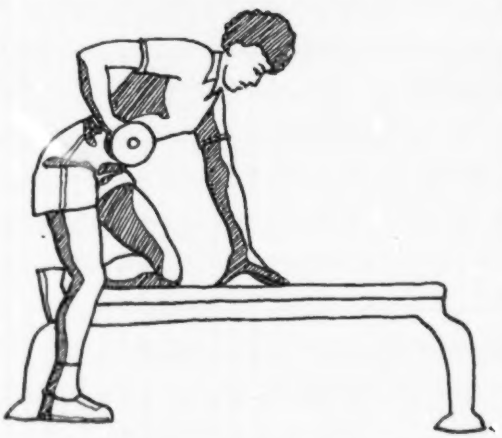
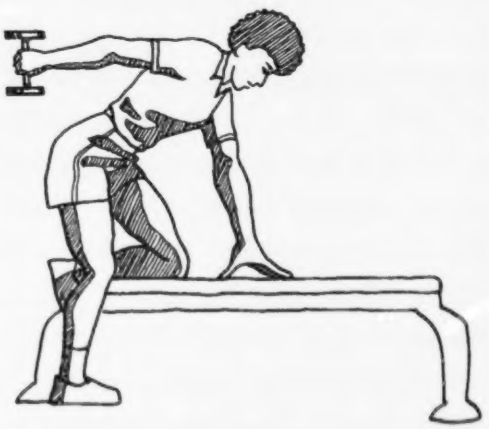


Figure 22. Triceps Kickback Extension Phase



Extension and Flexion

Sit straddling a bench so that your wrists are off the end of the bench. The extension is when the knuckles are facing up, and the flexion is when the palms are facing up. Move your hands throughout a full range of motion, without moving the body or upper arms (Figures 23 and 24).

Figure 23. Forearm Flexion, Raised Position

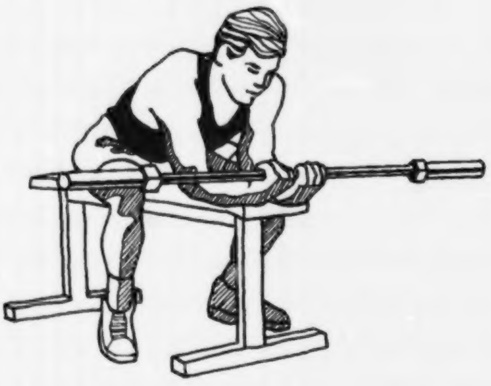
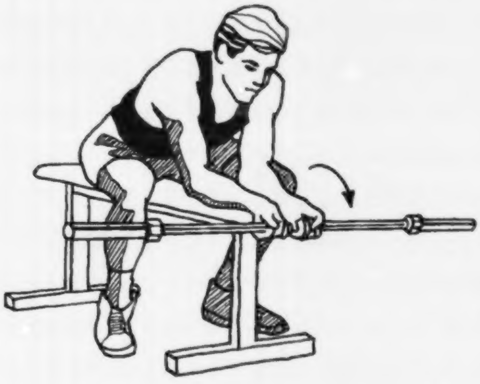


Figure 24. Forearm Flexion, Lowered Position



Supination and Pronation

Kneel on one side of a bench with one arm resting on the elbow in a 90% bend. Using a small weight (a hammer or a dumbbell bar with a weight on one end), supinate (palm up), and return to a pronated position (palm down). Repeat slowly for the desired number of reps (Figures 25 and 26).

Figure 25. Pronation

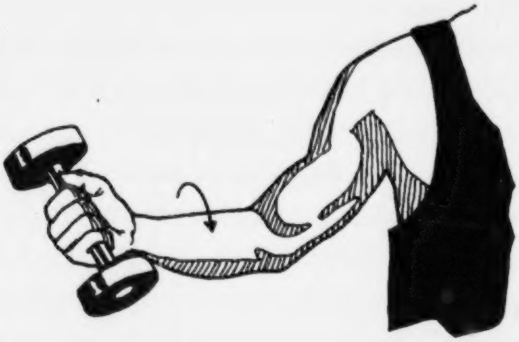
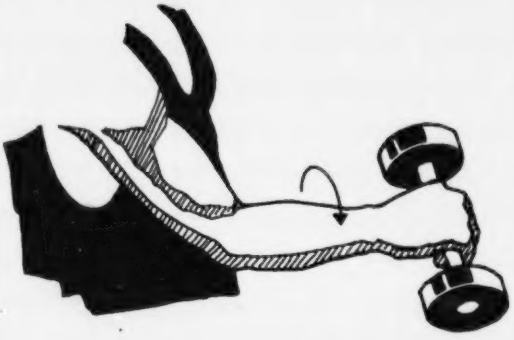


Figure 26. Supination



Abdominals

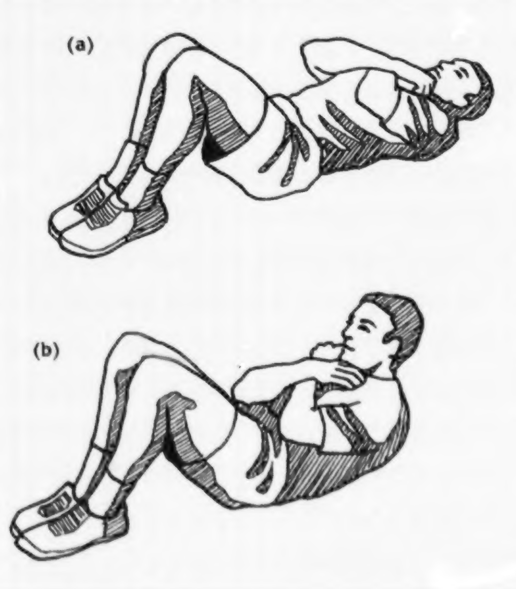
The abdominal muscles are a very large expanse of muscles with very important functions. Why, then, do people neglect them so? You have heard and read in the literature about abdominal *endurance*, which is *not* the reason for abdominal exercises. Abdominal *strength* is the important thing, in order to keep the internal organs in proper place and to support the lower back while lifting.

The exercises performed by many are nothing more than swinging the arms, moving the head, and lunging the shoulders to get a magic number of repetitions. The number of reps is not important; it is the quality of the exercise that gives us strong abs. The exercises described below are the abdominal crunch and the partial sit-up.

Crunch

Lying on your back with your knees pointed at the ceiling, cross your arms across your chest. From this position, raise the shoulders toward the ceiling, crunching to the middle. To make the move more effective, move slowly upward, pausing at the top, and then lower slowly back to the starting position. Concentrate on the abs so that the head and shoulders are just taken for a short ride. You will be able to do only a few of this type of abdominal exercise, but the positive benefits will be great (Figure 27a, b).

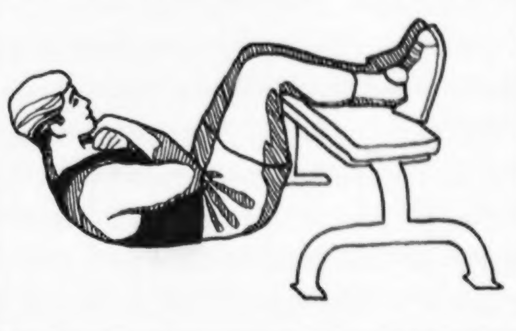
Figure 27. Abdominal Crunch



Partial Sit-Up

Lying on your back with your feet on a bench or chair with your knees bent 90%, cross your arms across your chest. From this position, raise your shoulders off the floor approximately 30-40% and return slowly to the starting position. Although this is a good exercise, it does not exercise the lower portion of the abdomen as well as the crunch (Figure 28).

Figure 28. Partial Sit-Up



Lower Back

The lower back is an area of great concern. Lower back pain causes millions of workers to take time off from work and costs companies billions of dollars. This is the "weak link" in humans and must be strengthened constantly or a painful injury may occur. One of the best guarantees of not having lower back pain is a strong abdomen. The next best guarantee against low back pain is to properly strengthen and maintain the muscles of the lumbar spine. Assuming that nothing is wrong other than weak muscles, I would recommend the following exercises: bent-leg dead lift, back extensions, and squats. These exercises also strengthen the gluteal muscles and, to some extent, the muscles of the upper leg.

Bent-Leg Dead Lift

The dead lift is a functional exercise, which means this movement is used in our daily life, such as when picking up a bag of groceries, a child, or a box of heavy books. The exercise is performed as follows:

1. Approach the bar until your shins touch or nearly touch it.
2. Squat by bending the knees, keeping the shoulders as high as possible (Figure 29).
3. Take the bar in an alternate grip, with one palm out, one palm in (Figure 30).

Figure 29. Dead Lift Preparation Phase

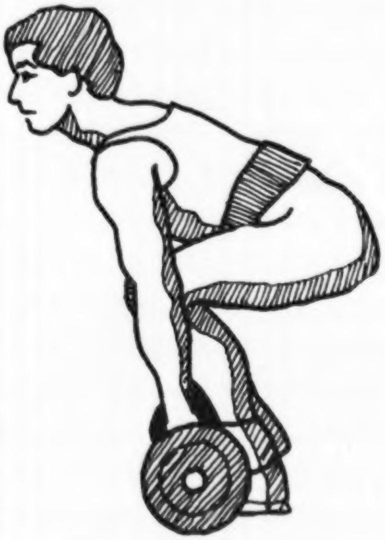
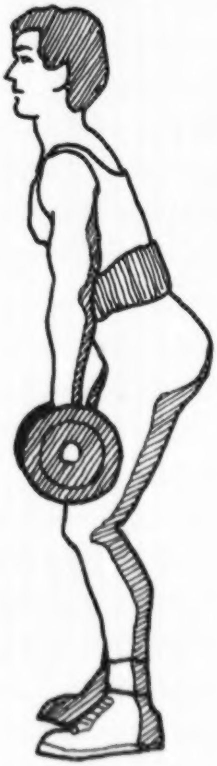


Figure 30. Dead Lift Execution



4. Keeping this position, stand up, keeping the arms straight and the abs contracted (Figure 31).
5. As the bar passes the knees the gluteal muscles (buttocks) take over and push forward, straightening the lower back to an upright position.
6. To lower the bar, reverse the procedure by letting the hips move back as you lower the weight by bending the knees.

Back Extensions

The back extension is performed either on a machine designed for that purpose or on a mat or floor.

1. Take a facedown position on the floor and, as if to balance on your abdomen, lift both ends of your body slightly from the floor and return.
2. If you have access to a machine, go to a head-down position and return to a horizontal position.

Figure 31. Dead Lift Finish

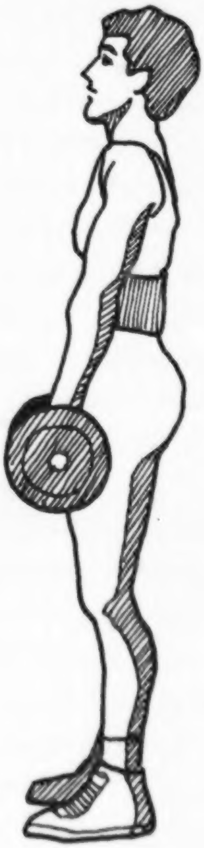


Figure 32. Back Extension

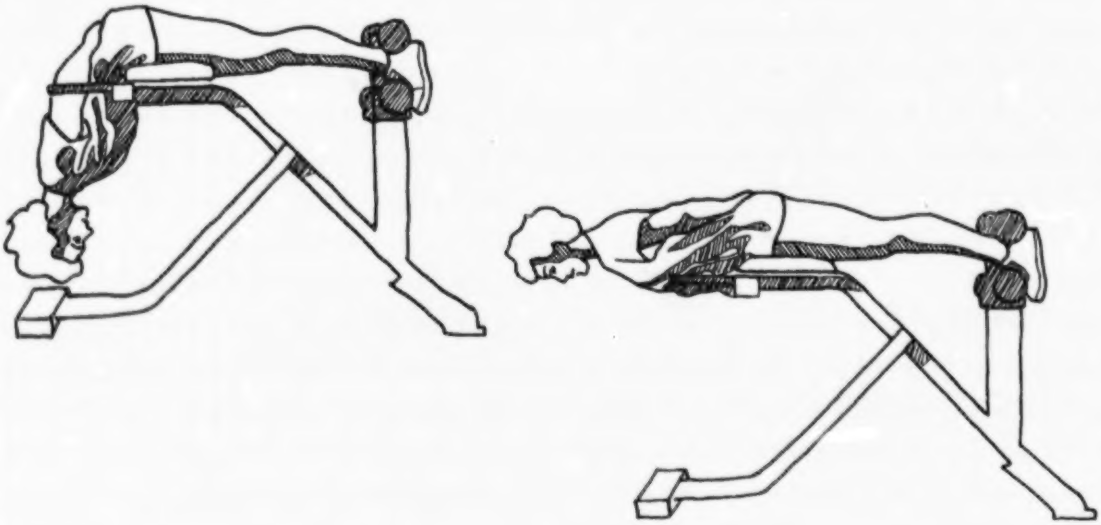
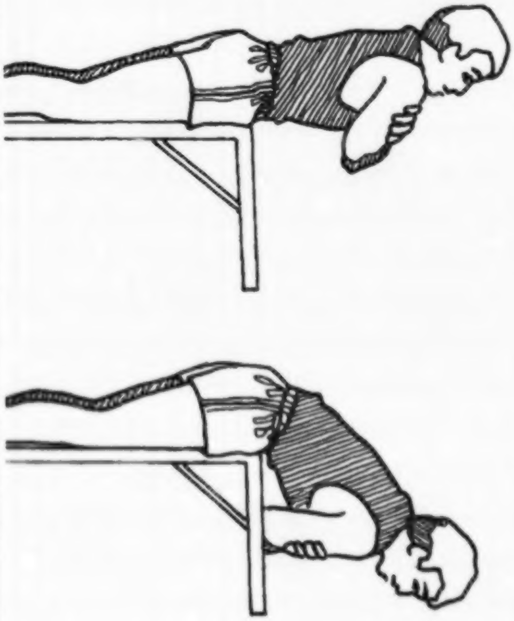


Figure 33. Back Extension



Never extend past horizontal. If a machine is not available, extend off the end of a bench with someone holding your legs (Figures 32 and 33).

Upper Leg

The upper leg is composed of the quadriceps and the hamstrings. These muscles are heavily involved in the squat and dead lift, but if you want to isolate these two areas, you should use machines designed for that purpose. They are called the knee extension and knee flexion machines.

Knee Extension

1. Sit on the machine and place the insteps or lower ankles under the padded lever arm (Figure 34a).
2. Push upward until the knees are completely extended, pause, and slowly lower the weight (Figure 34b).
3. Repeat until you complete the desired number of reps.

Knee Flexion

1. Lie on the machine facedown with your heels or lower ankles under the padded lever arm (Figure 35a).

Figure 34. Knee Extension

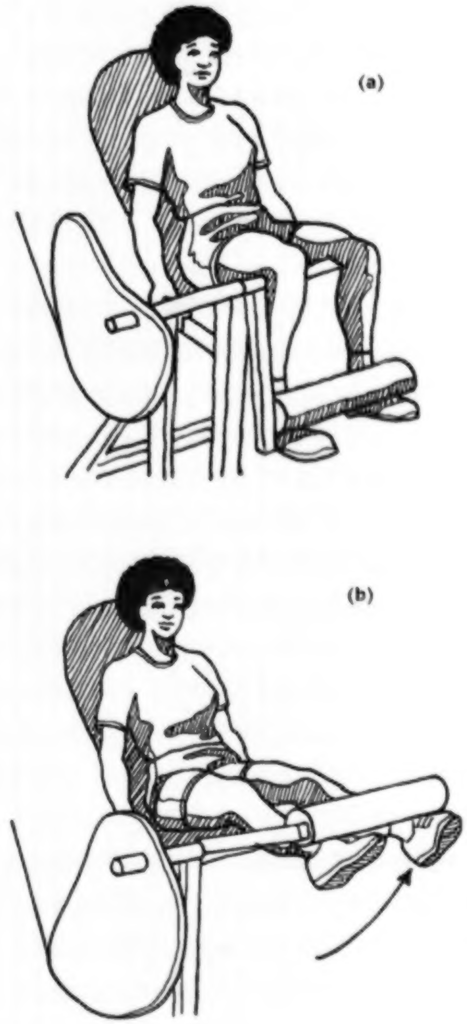
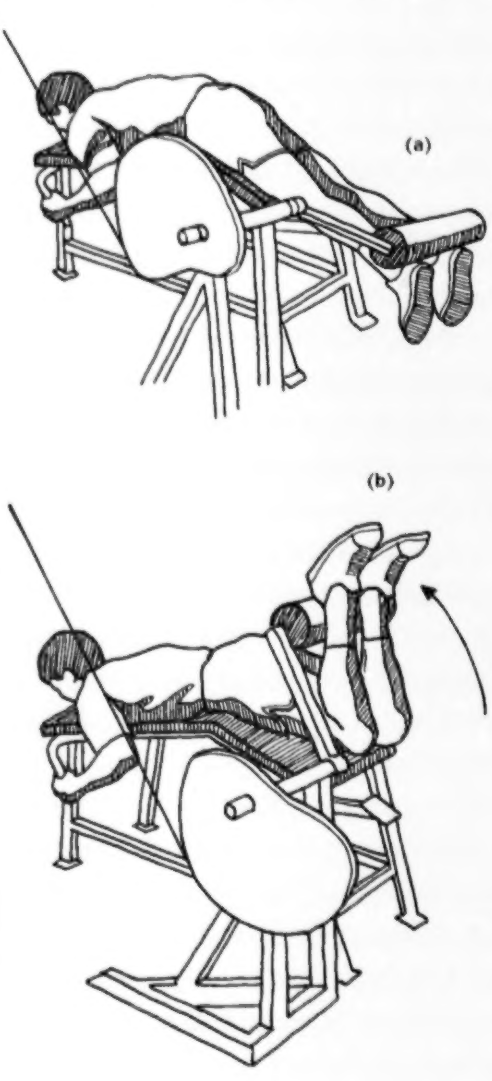


Figure 35. Knee Flexion



2. Curl the weight the maximum distance; the ideal movement is to have your heels touch your butt (Figure 35b).
3. Lower the weight slowly until your knee is almost straight before returning to the up position. Never let the knee extend completely with the weight.

Calves (Lower Leg)

There are two major muscles that make up the lower leg, the soleus and gastrocnemius. The soleus lifts the heel while sitting with the knees flexed 90 degrees, and the gastrocnemius lifts the heel while standing with the knee straight. In order to exercise both, two positions are presented here.

Seated Heel Raise

1. This exercise requires a machine, or you can place some weight on your knees in a seated position (Figure 36).
2. The balls of your feet should be on something higher than your heels. A 2x4 piece of wood is ideal for this.
3. Lift your heels as high as possible, slowly lower them until they are on the floor, and repeat.

Standing Heel Raise

1. Using any safe elevation for the balls of the feet, (the 2x4 piece of wood mentioned above is ideal) stand with both feet or one foot at a time on the board. (Figure 37a)
2. Elevate the heel or heels as high as possible; then slowly lower to full extension and repeat (Figure 37b).

The exercises mentioned and described will exercise all skeletal muscle areas of the body. However, variety becomes important when you become bored doing the same exercises each workout or when you reach a plateau and want to "shock" your muscles, or confuse them, so that they will continue to improve. Ask a qualified person to teach you any new exercises and not the weight room "know-it-all" who believes in the "no pain, no gain" theory, which becomes "no pain, no gain, no brain," if you follow it. Weight training is an excellent way to gain or maintain valuable muscle mass but should not be a total program. It is suggested that you also have a qualified person design an aerobic exercise program for you to follow in addition to your strength program for more complete health fitness development.

Figure 36. Seated Heel Raise

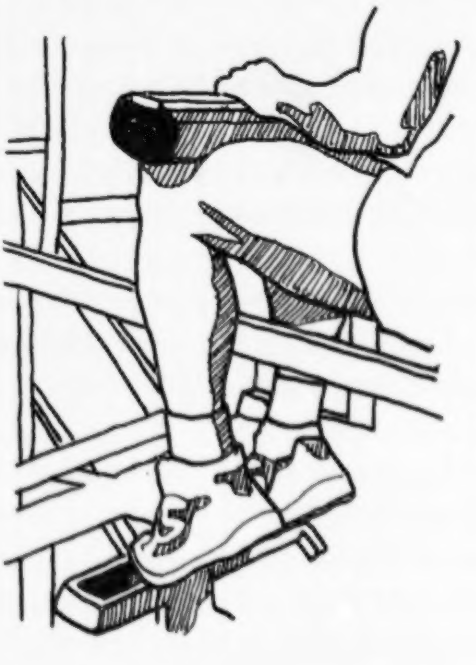
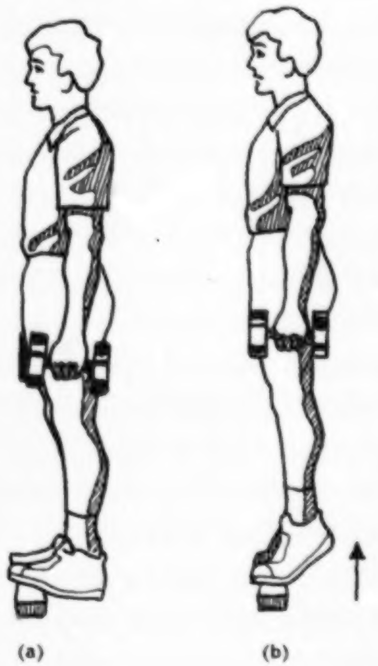


Figure 37. Standing Heel Raise



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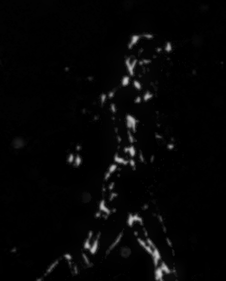

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